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PART I. GENERAL REVIEWS

Review of the Mineral-Fuel Industries in 1954

By T. W. Hunter, H. J. Barton, and J. A. Corgan

GENERAL SUMMARY

THE TOTAL production of energy in the United States in 1954 decreased 4.6 percent below 1953. The production of coal continued to decline, and the production of crude oil decreased for the first time since 1949. These decreases were partly offset by an increase in the production of natural gas. The total energy production of 35,365 trillion B. t. u. in 1954 was the lowest since 1950.

TABLE 1.—Energy produced by mineral fuels and waterpower in the United States, 1953–54

(Trillion British thermal units [1])

	1953	Percent of total	1954	Percent of total	Change from 1953 (percent)
Pennsylvania anthracite	786	2.1	739	2.1	−6.0
Bituminous coal and lignite	11,981	32.3	10,262	29.0	−14.3
Total coal	12,767	34.4	11,001	31.1	−13.8
Crude petroleum	13,671	36.9	13,427	38.0	−1.8
Natural gas, wet	9,116	24.6	9,488	26.8	+4.1
Total petroleum and natural gas [2]	22,787	61.5	22,915	64.8	+.6
Total mineral fuels	35,554	95.9	33,916	95.9	−4.6
Waterpower	1,522	4.1	1,449	4.1	−4.8
Grand total	37,076	100.0	35,365	100.0	−4.6

[1] The unit heat values employed are: Anthracite, 12,700 B. t. u. per pound; bituminous coal and lignite, 13,100 B. t. u. per pound; petroleum, 5,800,000 B. t. u. per barrel; natural gas, total production ×1,075 B.t. u. minus repressuring, vent, and waste gas×1,035. Waterpower includes installations owned by manufacturing plants and mines, as well as Government and privately owned public utilities. The fuel equivalent of waterpower is calculated from the kilowatt-hours of power produced, wherever available. This method of computation is true for all public-utility plants since 1919. Otherwise, the fuel equivalent is calculated from the reported horsepower of installed water wheels, assuming a capacity factor of 20 percent for factories and mines and 40 percent for public utilities.

[2] Includes gasoline, lubricants, and other products with which coal does not compete.

This drop in energy production was consistent with the 1.1-percent decline in gross national product during the year—from 364.5 billion dollars in 1953 to 360.5 billion in 1954.

As indicated in table 2, the production of bituminous coal dropped to the lowest point since the long depression of the 1930's in this industry. The output—392 million tons—was a severe decline from the average of 522 million tons per year for the postwar period 1946–53. Anthracite production declined further, to the lowest output since 1888. As many mines were closed, employment in the coal industry also dropped sharply and was the lowest since the turn of the century.

The general decline in business during 1954 resulted in a 0.6-percent decrease in consumption (runs to stills) of crude petroleum. This downturn, in contrast with the steady gains of recent years, reflected a 1.8-percent decrease in domestic production of crude oil, a 1.3-percent increase in imports, and a 16-million-barrel (5.8-percent) decrease in stocks. The production of natural gas increased 4.1 percent, however, in spite of the decreased business activity.

Crude-oil production was generally down throughout the country, except in the Rocky Mountain States. The increase in that area reflected the growth of pipeline outlets, as lines were extended to fields discovered and developed in recent years. Increases in natural-gas production were general among the major producing States, except for California, where there was a decrease.

TABLE 2.—Salient statistics of the fuel industries in the United States, 1953–54

	1953	1954	Change from 1953 (percent)
Production:			
Bituminous coal — million net tons	457.3	391.7	−14.3
Crude petroleum — million bbl.	2,357.1	2,315.0	−1.8
Natural gas, marketed production — billion cubic feet	8,396.9	8,742.5	+4.1
Anthracite — million net tons	30.9	29.1	−5.8
Value of production:			
Bituminous coal, f. o. b. mines or plants — million dollars	2,249.9	1,766.6	−21.5
Crude petroleum, value of production at wells — do	6,327.1	6,424.9	+1.5
Natural gas, value at wells — do	755.0	882.5	+13.9
Anthracite, f. o. b. mines or plants — do	299.1	247.9	−17.1
Consumption (apparent):			
Bituminous coal — million net tons	426.8	363.1	−14.9
Crude petroleum, runs to stills — million bbl	2,554.9	2,539.6	−.6
Natural gas — billion cubic ft	7,979.3	8,402.9	+5.3
Anthracite — million net tons	28.0	26.9	−3.9
Stocks, year end:			
Bituminous coal — do	85.4	73.5	−13.9
Crude petroleum — million bbl	274.4	258.4	−5.8
Natural gas — billion cubic ft	404.8	432.3	+6.8
Anthracite — million net tons [1]	4.2	2.8	−33.3
Imports:			
Bituminous coal — million net tons [2]	.2	.2	-------
Crude petroleum — million bbl.[3]	236.5	239.5	+1.3
Natural gas — billion cubic ft.[3]	9.2	6.8	−26.1
Anthracite — thousand net tons [2]	31.4	5.8	−81.5
Exports:			
Bituminous coal — million net tons	33.8	31.0	−8.3
Crude petroleum — million bbl.[2]	19.9	13.6	−31.7
Natural gas — billion cubic ft.[3]	28.3	28.7	+1.4
Anthracite — million net tons [2]	2.7	2.9	+7.4
Employment:			
Bituminous coal (average number working daily), in thousand	293.1	227.4	−22.4
Crude petroleum and natural gas (annual average in thousand) [4]	297.4	303.8	+2.2
Anthracite (average number men working daily), in thousand	57.9	44.0	−24.0

[1] Producers and estimated retail-dealer stocks only.
[2] U. S. Department of Commerce.
[3] Bureau of Mines data.
[4] Bureau of Labor Statistics, U. S. Department of Labor.

The number of wells drilled for oil and gas during 1954 (52,919) established a new record and was 10 percent greater than in 1953. The percentage of oil wells completed (56.3) was slightly higher than in recent years, but the percentage of gas wells and dry holes fell slightly.

CONSUMPTION

Bituminous-coal consumption declined in 1954 in every consumer category except electric power utilities. Consumption at coke ovens and steel and rolling mills dropped 28.7 million tons. Decreases in other consumer categories were as follows: 10.4 million tons by railroads (Class I), 18.5 million tons by "other industrials," 0.2 million tons in bunker fuel used in foreign trade, 0.2 million tons at cement mills, and 8.7 million tons in retail deliveries. These declines which totaled 66.7 million tons were partly offset by an increase of 3 million tons in bituminous-coal consumption at electric power utilities. Exports of bituminous coal decreased 2.7 million tons from the 1953 level.

As the demand for industrial sizes of anthracite generally exceeds supply, the continuing recession in anthracite consumption was attributable to relatively mild weather conditions and to the inroads made in the primary anthracite-marketing areas by competitive fuels.

TABLE 3.—Consumption of bituminous coal and lignite in the United States, 1953–54, by major consumer groups

(Thousand net tons)

Year	Electric power utilities [1]	Class I railroads [2]	Coke plants	Steel and rolling mills	Cement mills	Other industrials	Retail deliveries	Bunker foreign trade [3]	Total
1953	112, 283	27, 735	112, 874	6, 207	8, 362	97, 437	61, 295	605	426, 798
1954	115, 235	17, 370	85, 391	4, 944	8, 124	78, 953	52, 616	427	363, 060

[1] Federal Power Commission.
[2] Association of American Railroads.
[3] Bureau of Census, U. S. Department of Commerce.

TABLE 4.—Sales of fuel oils and natural gas in the United States, 1953–54, by major consumer groups

(Fuel oils—thousand barrels, natural gas—million cubic feet)

	Railroads	Vessels	Gas and electric power-plants	Smelters, mines, and manufactures	Space heating and cooking	Military	Oil-company fuel	Miscellaneous	Total
Distillate fuel oil:									
1953	75, 246	16, 898	6, 825	42, 384	283, 100	9, 569	7, 755	47, 067	488, 844
1954	77, 389	15, 563	6, 070	41, 589	320, 117	8, 752	7, 699	49, 066	526, 245
Residual fuel oil:									
1953	28, 477	114, 324	85, 352	166, 748	81, 824	30, 435	51, 243	6, 326	564, 729
1954	16, 122	108, 790	70, 749	160, 121	78, 845	26, 887	52, 165	7, 035	520, 714
Natural gas:									
1953	-------	--------	[1] 1, 034, 272	3, 733, 405	2, 216, 153	-------	2, 029, 780	-------	7, 979, 338
1954	-------	--------	[1] 1, 165, 498	3, 903, 449	2, 479, 205	-------	2, 020, 198	-------	8, 402, 852

[1] Memo entry, not additive, includes gas other than natural. Natural-gas component included under "smelters, mines, and manufactures."

The pattern of changes in the consumption of petroleum products during 1954 showed that consumer incomes and spending were well maintained, in spite of the drop in industrial activity. Gasoline consumption in 1954 was about 2 percent greater than in the preceding year, and use of oil for house heating increased 7.5 percent. Although railroad use of diesel fuel rose 3 percent, all other categories of industrial fuel-oil consumption were lower in 1954 than in 1953. Exports of both crude oil and products in 1954 were below those in 1953; their combined decrease was 12.5 percent. The consumption of natural gas increased substantially—5.3 percent—as the effect of the transmission lines that were extended to New England during 1953 became fully evident. Nonindustrial uses of natural gas (heating and cooking) rose 12 percent, while industrial uses, including consumption by the petroleum industry, was up only 3 percent.

EMPLOYMENT AND WORKING TIME

The average number of employees working daily in the bituminous-coal- and anthracite-mining industries declined 22.4 and 24.0 percent, respectively, in 1954 from 1953. The average daily working force in the bituminous-coal and lignite industry in 1954 totaled 227,397 men, compared with 293,106 in 1953. In the anthracite industry the decline was from 57,862 to 43,996. Because of competitive pressures for continually advancing efficiency in coal production, it is significant that the net tons mined per man-day in 1954 in the bituminous-coal and lignite industry was 9.47, compared with 8.17 in 1953. The output per man-year increased from 1,560 tons to 1,724.

In the anthracite industry the output per man-day increased from 3.28 tons in 1953 to 4.02 in 1954, owing principally to the increased percentage of strip production. The output per man per year was 659 net tons in 1954, compared with 535 in 1953.

The total employment in the petroleum industry during 1954 was 1,647,000, about 1.5 percent less than in the preceding year. Of this total, 306,200 were engaged in the production division, 222,800 in refining, 124,000 in transportation, 234,800 in wholesale distribution, and 759,200 in retail distribution.

The average weekly hours worked in 1954 in the bituminous-coal industry decreased from 34.4 in 1953 to 32.6 in 1954. For the anthracite industry, the average weekly hours worked in 1954 was 30.0. In 1954 the bituminous-coal industry averaged 182 days of work, as against 191 days in 1953. In the anthracite industry the average number of days worked increased from 163 to 164.

As wages strongly influence total production costs in the fuel industries, wage increases granted by the respective branches of the fuel industries are significant. In 1954 hourly earnings in the bituminous-coal industry were unchanged from 1953. In the anthracite industry hourly earnings increased 1.6 percent. In petroleum and natural-gas production they rose 2.7 percent. In absolute figures, hourly earnings in the anthracite industry were $2.52, in the bituminous-coal industry $2.48, and in the petroleum industry $2.27. Because of the more regular work in the petroleum industry, weekly earnings in this industry were highest of the three—$91.94—followed by bituminous coal with $80.85, and anthracite with $75.60.

TABLE 5.—Hours worked and gross earnings of production workers in the fuel industries, 1950–54

[Bureau of Labor Statistics, U. S. Department of Labor]

	1950	1951	1952	1953	1954
Bituminous coal:					
Average weekly earnings	$70.35	$77.79	[1] $78.09	$85.31	$80.85
Average weekly hours	35.0	35.2	[1] 34.1	34.4	32.6
Average hourly earnings	$2.01	$2.21	$2.29	$2.48	$2.48
Anthracite:					
Average weekly earnings	$63.24	$66.66	$71.19	$72.91	$75.60
Average weekly hours	32.1	30.3	31.5	29.4	30.0
Average hourly earnings	$1.97	$2.20	$2.26	$2.48	$2.52
Petroleum and natural gas production (except contract services):					
Average weekly earnings	$73.69	$79.76	$85.90	$90.39	$91.94
Average weekly hours	40.6	[1] 40.9	[1] 41.1	40.9	40.5
Average hourly earnings	$1.82	$1.95	$2.09	$2.21	$2.27

[1] Revised.

FUEL PRICES

The index of wholesale prices for all commodities increased from 110.1 in 1953 to 110.3 in 1954 (see table 6). The average value per ton, f. o. b. mines, for bituminous coal declined from $4.92 to $4.51 and for anthracite from $9.67 to $8.52. The average price per barrel at the well for crude petroleum rose from $2.68 in 1953 to $2.78 in 1954. This increase reflected the general price increase in mid-1953, which continued in effect throughout 1954. There were no general price changes during 1954.

For natural gas the 1954 average price at the wells of 10.1 cents per thousand cubic feet was 0.9 cent higher than in 1953.

The index of wholesale prices for petroleum and petroleum products in 1954 was 110.8 percent of the 1947–49 base and 1.7 percent below the 1953 level.

TABLE 6.—Average monthly wholesale price indexes for fuels, 1949–54

(1947–49=100)

[Bureau of Labor Statistics, U. S. Department of Labor]

	1949	1950	1951	1952	1953	1954
Gas	101.5	98.2	100.7	103.7	107.8	108.8
Petroleum and petroleum products	100.1	103.7	110.5	109.3	112.7	110.8
Coal	105.8	106.2	108.4	108.7	112.8	106.3
Average index for all commodities	99.2	103.1	114.8	111.6	110.1	110.3

Convenience and price are significant factors in the competition among the various fuels. Another important factor that strongly influences utilization of fuels is transportation cost. Compared with the relatively low cost of pipeline transmission of oil and natural gas, almost 80 percent of all bituminous coal is shipped via railroads at rates in 1954 that added 72 percent to the coal cost f. o. b. mines. The average railroad freight-rate charge per net ton on bituminous coal and lignite in 1954 was $3.23, a decrease of 10 cents per ton from 1953.

Data on wholesale prices of bituminous coal for 1953 and 1954 are not fully comparable (as indicated in table 7), because the Bureau of Labor Statistics, United States Department of Labor, changed its method of collecting these data beginning with May 1954.

TABLE 7.—Comparative fuel prices, 1953–54

Fuel	1953	1954
Bituminous coal:		
Average wholesale prices, dollars per net ton: [1]		
Prepared sizes	[2] 6.86	[2] 6.61
Mine run	[2] 5.89	[2] 5.54
Screenings	[2] 4.88	[2] 4.63
Other average prices, dollars per net ton:		
Railroad fuel, f. o. b. mine [3]	4.77	4.60
Average retail price [1]	14.95	14.94
Cost of coal at merchant coke ovens	10.01	9.57
Anthracite, average sales realization per net ton on Pennsylvania anthracite from breakers to points outside region, dollars:		
Chestnut	13.77	12.01
Pea	10.43	9.18
Buckwheat No. 1	9.33	8.15
Petroleum and petroleum products:		
Crude petroleum, average price per barrel at well ... dollars	2.68	2.78
Gasoline, average dealers' net price (excluding taxes) of gasoline in 50 U. S. cities ... cents per gallon [4]	15.95	16.19
Residual fuel oil:		
No. 6 fuel oil, average of high and low prices in Philadelphia ... dollars per barrel (refinery)[5]	2.34	2.28
Bunker C, average price for all Gulf ports ... dollars per barrel (refinery)[5]	1.82	1.93
Distillate, fuel oil:		
Gas oil, average of high and low prices at Philadelphia ... cents per gallon (refinery)[5]	10.1	9.7
No. 2 distillate, average for all Gulf ports ... cents per gallon (refinery)[5]	8.4	8.5
Natural gas:		
Average U. S. value, at well ... cents per thousand cubic feet	9.2	10.1
Average U. S. value, at points of consumption ... cents per thousand cubic feet	35.5	38.1
Average wholesale price index for all commodities [1]	110.1	110.3

[1] Bureau of Labor Statistics, U. S. Department of Labor.
[2] January through April only. Data not comparable for entire year.
[3] Interstate Commerce Commission.
[4] The Texas Co.
[5] Platt's Oil Price Handbook.

NATIONAL INCOME ORIGINATED, WAGES, AND SALARIES

As compared to a 1.3-percent decrease in national income originated during the year, income in the bituminous-coal and anthracite industries dropped 22.7 and 20.5 percent, respectively, below 1953. In the crude-petroleum and natural-gas industries income increased 1.6 percent.

Although total United States wages and salaries decreased 1.1 percent, wages and salaries in the bituminous-coal and anthracite industries dropped 24.1 and 22.4 percent, respectively, owing to the heavy drop in employment. In the crude-petroleum and natural-gas industries there was an increase of 4.1 percent.

TABLE 8.—National income originated and wages and salaries in the fuel industries, 1952–54

[U. S. Department of Commerce]

	Million dollars		
	1952	1953	1954
National income originated:			
Bituminous- and other soft-coal mining	1,565	1,509	1,167
Anthracite	252	195	155
Crude petroleum and natural gas	2,278	2,478	2,517
Total	4,095	4,182	3,839
United States national income	289,537	303,648	299,673
Total as a percent of U. S. national income	1.4	1.4	1.3
Wages and salaries:			
Bituminous- and other soft-coal mining	1,256	1,209	918
Anthracite	224	183	142
Crude petroleum and natural gas	1,292	1,381	1,437
Total	2,772	2,773	2,497
Total United States wages and salaries	185,124	198,483	196,244
Total as a percent of total United States wages and salaries	1.5	1.4	1.3

ENERGY FUELS IN INTERNATIONAL TRADE

United States coal exports (bituminous and anthracite) were approximately 34 million net tons compared with 36.5 million tons in 1953—a decline of about 7 percent. Movements of bituminous coal to Canada, amounting to 15.9 million net tons, decreased sharply in comparison with 19.6 million tons shipped in 1953. Anthracite shipments to Canada were down 145,000 tons. Exports to Europe showed an appreciable increase of 2.4 million tons (2.2 million tons of bituminous and 0.2 million tons of anthracite). Asia imported 3 million tons of United States bituminous coal, 0.9 million tons less than in 1953, chiefly because of curtailed Japanese requirements for United States coal. Exports to Africa increased slightly (25,000 tons) because of Southern Rhodesia's inability to produce adequate supplies from indigenous sources. Shipments to South America were down almost 0.4 million tons, due primarily to Argentina's shift to European suppliers; however, Brazil increased its imports of bituminous coal from the United States by 262,000 tons. Exports to Chile and Uruguay decreased 57,000 and 10,000 tons, respectively.

Exports of both crude petroleum and refined products continued to drop, and the combined decrease for 1954 was 11.5 percent. Imports of crude oil and products increased only slightly (2 percent) in 1954, reflecting the relatively weak markets in this country and the continued efforts of other foreign producing countries to make up the deficit created by the shutdown of operations in Iran after nationalization. After the Iranian oil problem was solved late in 1954 and that country's substantial production was added to the world total, additional pressure to move oil to the United States was inevitable.

WORLD REVIEW

COAL

World coal production in 1954 (bituminous, anthracite, and lignite) was estimated at 1,959 million metric tons, an increase of 2 million tons over 1953. The total output on a continental basis was as follows:

	Million metric tons
North America	397
South America	6
Europe:	
Free countries	600
U. S. S. R. and satellites	725
Asia	164
Africa	34
Oceania	33
	1, 959

The 1954 output in the United States declined approximately 61 million metric tons from 1953, because of lower domestic and export demands.

The most notable production increase in 1954 took place in the U. S. S. R. and Soviet Bloc countries, where the total output was approximately 44 million tons more than in 1953, while the output in Western Europe increased about 8 million tons. In Western Europe there was a general, though slight, increase in productivity, except in the Netherlands.

Coal and lignite consumption in Western Europe amounted to about 514 million metric tons in coal equivalent in 1954, compared with 507 million tons in 1953. Coal supplied approximately 71 percent of the total energy requirements. The increased demand for coal in Europe began to assert itself in the latter half of 1953, and the generally improved economic activity remained high in 1954, particularly in the iron and steel industries.

TABLE 9.—Trends in Western Europe coal productivity, selected countries, 1950 and 1953–54

Country	Number of workers overall (thousand)			Output per man-shift overall (metric tons)		
	1950	1953	1954	1950	1953	1954
Belgium	157	156	150	0. 693	0. 766	0. 784
France	259	229	220	. 768	. 926	. 988
Germany (West)	391	435	432	1. 063	1. 104	1. 126
Netherlands	42	47	48	1. 112	. 986	. 967
Saar	60	58	57	. 960	1. 082	1. 119
United Kingdom	697	717	707	1. 211	1. 239	1. 250

Source: United Nations Quarterly Bulletin of Coal Statistics for Europe, Vol. III, No. 1, June 1954, and Vol. V, No. 3, December 1956.

In Asia total production in 1954 was about 8 million metric tons higher than in 1953. Production in Japan declined over 4 million tons in 1954. Taiwan, Pakistan and Malaya also reported decreases. Communist China, however increased its coal output 10 million tons. Increases in production were also reported for India, Indonesia, Korea, Turkey, and North Vietnam.

Africa continued to increase its coal output in 1954 and produced 34 million metric tons—1 million tons more than in 1953. Most of the increase was in the Union of South Africa, where growing industrial activity has created larger energy requirements. Full productive capacity cannot be attained in the Union of South Africa and Southern Rhodesia because of a continued shortage of railroad facilities. The demand for coal continued to exceed availability in both areas.

Oceania also reported gains in coal production. Australia reported an increase of 2.4 million metric tons of bituminous coal and lignite; a large share of it was attributed to greater demand for electric power production. New Zealand reported relatively small gains in the production of both bituminous coal and lignite.

PETROLEUM

The world output of crude petroleum in 1954—4,991 million barrels—was 4.6 percent greater than in 1953, despite the decreased United States production. World production, excluding that of the United States, was 2,675 million barrels, an increase of 10.8 percent over 1953. The proportion of total world production produced by the United States declined from 49.4 percent in 1953 to 46.4 percent in 1954, continuing the downward trend of recent years. All other major producing areas increased their production, both in actual quantities and in percentage of the world total. The percentage of the total produced in Asia (principally the Middle East) rose from 21.2 to 22.7, and the proportion produced in both South America and Europe increased slightly.

Of special significance was the return of Iranian oil to the world market in 1954. When the Iranian Government nationalized the oil industry which had been British-owned, in 1951, oil was produced only to supply local requirements. A settlement agreeable to both parties was reached late in 1954, and restoration of operations began in November. Iran produced 242 million barrels of crude oil, or 6.4 percent of the world total in 1950, before nationalization. It is expected that it will gradually regain this position during the next 2 or 3 years.

Statistical Summary of Mineral-Fuels Production

By Thelma K. Stewart

GENERAL SUMMARY

TABLES in this chapter summarize mineral-fuels production in the continental United States, defined as the 48 States and the District of Columbia, by individual fuels, both in terms of quantity and value of production. The total value of all mineral production, including mineral fuels, is also shown to provide an integrated summary of the mineral industries during 1954. For a detailed summary of all minerals other than fuels, see volume I of the Minerals Yearbook.

The value of all mineral production, by States, is given in table 3. Bituminous-coal production includes all marketable production, excluding washery and other refuse, while anthracite production is measured at the sizing and cleaning stage.

Crude petroleum is measured at the time it is removed from the producing property, and natural-gas liquids are measured in the form in which they are shipped from the natural-gasoline or cycle plants. For precise description of the stage of measurement, see the individual commodity chapters.

World production and the proportion of the total produced by the United States are given in table 4.

The surveys of natural-gas liquids, bituminous coal and lignite, anthracite, asphalt, and peat for 1954 were conducted jointly with the Bureau of Census, United States Department of Commerce, as a part of the Census of Mineral Industries for 1954. In all cases where applicable, any discrepancies with data published by the Bureau of the Census will be reconciled in the Minerals Yearbook, Volume II—Fuels, for 1955.

As a result of this joint effort, 11 natural-gas-liquid plants that had not been reporting to the Bureau of Mines were disclosed. Several of these were plants that dehydrate gas for pipeline movement and had not been considered natural-gasoline plants, but it developed that they do produce and ship natural-gas liquids. All these plants are now included in the Bureau of Mines surveys.

The Census of Mineral Industries covering crude petrolum and natural gas was conducted independently of the Bureau of Mines. There are several inconsistencies between data published by Bureau of the Census and those appearing in this volume. Most of these can be explained by the fact that the Bureau of the Census did not collect data from installations with shipments valued at less than $500, whereas Bureau of Mines reports represent complete coverage.

Coke and coal chemicals, fuel briquets and packaged fuel, and carbon black canvasses were conducted by the Bureau of Mines.

TABLE 1.—Value of mineral production in continental United States, 1925–54, by mineral groups[1]

[Million dollars]

Year	Mineral fuels	Nonmetallic minerals (except fuels)	Metals	Total	Year	Mineral fuels	Nonmetallic minerals (except fuels)	Metals	Total
1925	2,910	1,187	715	4,812	1940	2,662	784	752	4,198
1926	3,371	1,219	721	5,311	1941	3,228	989	890	5,107
1927	2,875	1,201	622	4,698	1942	3,568	1,056	990	5,623
1928	2,666	1,163	655	4,484	1943	4,028	916	987	5,931
1929	2,940	1,166	802	4,908	1944	4,574	836	900	6,310
1930	2,500	973	507	3,980	1945	4,569	888	774	6,231
1931	1,620	671	287	2,578	1946	5,090	1,243	729	7,062
1932	1,460	412	128	2,000	1947	7,188	1,338	1,084	9,610
1933	1,413	432	205	2,050	1948	9,502	1,552	1,219	12,273
1934	1,947	520	277	2,744	1949	7,920	1,559	1,101	10,580
1935	2,013	564	365	2,942	1950	8,689	1,822	1,351	11,862
1936	2,405	685	516	3,606	1951	9,779	2,079	1,671	13,529
1937	2,798	711	756	4,265	1952	9,615	2,163	1,614	13,392
1938	2,436	622	460	3,518	1953	10,249	[2] 2,342	[2] 1,797	[2] 14,388
1939	2,423	754	631	3,808	1954	9,909	2,718	1,506	[3] 14,033

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[1] Data for 1925–46 are not strictly comparable with those for subsequent years, since for the earlier years the value of heavy clay products has not been replaced by the value of raw clays used in such products.

[2] Revised figure.

[3] The total has been adjusted to eliminate duplication in the value of clays and stone.

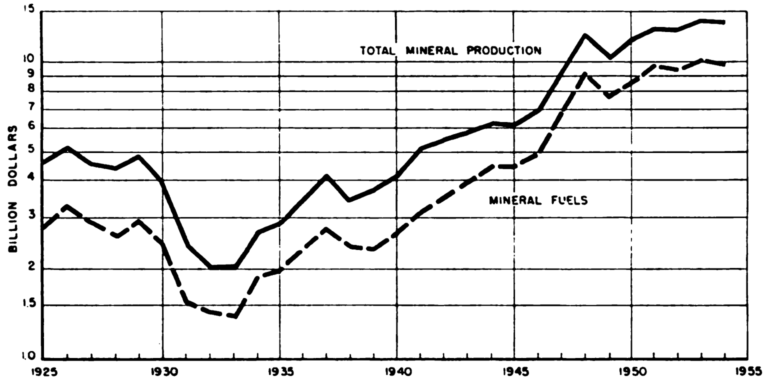

FIGURE 1.—Value of mineral production in continental United States, 1925–54.

TABLE 2.—Mineral-fuels production in continental United States, 1951–54, by individual fuels

Mineral fuels	1951		1952		1953		1954	
	Quantity	Value (thousand dollars)	Quantity	Value (thousand dollars)	Quantity	Value (thousand dollars)	Quantity	Value (thousand dollars)
Petroleum asphalt: Bituminous limestone and sandstone......short tons	1,378,434	4,159	1,570,698	4,688	1,440,544	4,349	1,337,822	3,686
Gilsonite......do	65,521	1,895	60,740	1,780	60,505	2,184	75,943	2,724
Carbon dioxide, natural (estimated)......thousand cubic feet	547,436	161	737,000	226	670,600	203	638,900	211
Coal:								
Bituminous[1]......thousand short tons	529,880	2,614,219	463,138	2,276,189	453,578	2,232,707	386,797	1,749.539
Lignite......do	3,291	8,044	3,017	7,212	2,851	6,785	4,243	10.330
Pennsylvania anthracite......do	42,670	405,818	40,583	379,714	30,949	299,140	29,083	247,870
Helium (shipments)......thousand cubic feet	106,970	1,387	145,492	1,891	157,652	[2] 2,103	189,873	3,202
Natural gas......million cubic feet	7,457,359	542,964	8,013,457	623,649	8,396,916	774,966	8,742,546	882,501
Natural-gas liquids:								
Natural gasoline and cycle products......thousand gallons	4,971.834	369,718	5,102,244	371,468	5,327,448	406,242	5,385,282	402,418
LP-gases......do	3,627,834	138,443	4,285,386	161,692	4,692,870	191,598	5,204,304	178,994
Peat......short tons	194,416	1,489	210,582	1,730	204,209	1,618	243.257	2,249
Petroleum (crude)......thousand barrels	2,247,711	5,690,410	2,289,836	5,785,230	2,357,082	6,327,100	2,316,223	6,424,930
Total mineral fuels	------------	9,779,000	------------	9,615,000	------------	10,249,000	------------	9,909,000
Total all other minerals	------------	3,750,000	------------	3,777,000	------------	4,139,000	------------	4,124,000
Grand total, mineral production	------------	13,529,000	------------	13,392,000	------------	14,388,000	------------	14,033,000

[1] Includes small quantity of anthracite mined in States other than Pennsylvania; excludes Alaska.
[2] Revised.

TABLE 3.—Value of mineral production in continental United States, 1951–54, by States, in thousand dollars, and principal minerals produced in 1954

State	1951	1952	1953	1954			
				Value	Rank	Percent of United States total	Principal minerals in order of value
Alabama	164, 280	158, 382	[1] 187, 087	151, 330	20	1. 08	Coal, iron ore, cement, stone.
Arizona	243, 886	231, 702	256, 616	252, 959	17	1. 80	Copper, cement, zinc, gold.
Arkansas	119, 844	117, 687	127, 090	131, 745	21	. 94	Petroleum, bauxite, sand and gravel, stone.
California	1, 210, 076	1, 215, 130	[1] 1, 393, 963	1, 429, 741	2	10. 19	Petroleum, natural-gas liquids, natural gas, cement.
Colorado	179, 435	187, 589	211, 586	256, 197	15	1. 83	Petroleum, molybdenum, coal, cement.
Connecticut	6, 247	7, 125	7, 917	9, 581	45	. 07	Sand and gravel, stone, lime, clays.
Delaware	584	677	659	947	48	. 01	Sand and gravel, stone, clays.
District of Columbia	82	7	15	-----	-----	-----	Clays.
Florida	76, 897	82, 878	92, 336	106, 510	26	. 76	Phosphate rock, stone, cement, clays.
Georgia	46, 675	51, 450	51, 395	55, 803	31	. 40	Clays, stone, cement, sand and gravel.
Idaho	83, 171	77, 848	[1] 67, 000	69, 693	29	. 50	Lead, silver, zinc, phosphate rock.
Illinois	489, 934	460, 005	462, 443	473, 077	7	3. 37	Petroleum, coal, stone, sand and gravel.
Indiana	174, 388	162, 031	169, 781	165, 369	19	1. 18	Coal, cement, petroleum, stone.
Iowa	47, 706	52, 481	51, 994	58, 798	30	. 42	Cement, stone, sand and gravel, coal.
Kansas	400, 087	403, 370	413, 231	449, 587	8	3. 20	Petroleum, natural gas, cement, stone.
Kentucky	442, 264	398, 446	381, 742	327, 503	11	2. 33	Coal, petroleum, natural gas, stone.
Louisiana	787, 678	848, 401	965, 237	997, 107	3	7. 11	Petroleum, natural gas, natural-gas liquids, sulfur.
Maine	8, 516	8, 981	10. 503	10, 716	44	. 08	Cement, sand and gravel, stone, slate.
Maryland	26, 153	26, 847	27, 085	30, 743	39	. 22	Sand and gravel, stone, cement, coal.
Massachusetts	17, 077	17, 812	17, 191	18, 851	42	. 13	Stone, sand and gravel, lime, clays.
Michigan	258, 471	254, 518	286, 487	280, 150	14	2. 00	Iron ore, cement, petroleum, salt.
Minnesota	432, 577	397, 440	542, 545	351, 475	10	2. 50	Iron ore, sand and gravel, stone, cement.
Mississippi	103, 030	101, 875	107, 868	110, 563	25	. 79	Petroleum, natural gas, sand and gravel, cement.
Missouri	135, 249	140, 977	128, 297	131, 332	22	. 94	Lead, cement, stone, lime.
Montana	126, 376	122, 069	132, 184	126. 412	24	. 90	Copper, petroleum, zinc, sand and gravel.
Nebraska	18, 469	20, 597	33, 281	42, 393	35	. 30	Petroleum, cement, sand and gravel, stone.
Nevada	57, 674	64, 231	73, 523	89, 138	28	. 63	Copper, tungsten, manganese ore, sand and gravel.
New Hampshire	1, 295	1, 945	1, 805	2, 112	46	. 02	Sand and gravel, stone, feldspar, mica.
New Jersey	60, 099	57, 468	51, 945	47, 044	34	. 33	Sand and gravel, stone, zinc, iron ore.
New Mexico	256, 302	288, 500	[1] 336, 580	373, 599	9	2. 66	Petroleum, potassium salts, copper, natural gas.

New York	188, 816	180, 751	186, 868	192, 764	18	1. 37	Cement, iron ore, stone, sand and gravel.
North Carolina	29, 647	34, 726	[1] 38, 451	41, 651	36	. 30	Stone, tungsten concentrate, sand and gravel, mica.
North Dakota	10, 247	12, 057	19, 237	22, 223	40	. 16	Petroleum, sand and gravel, natural-gas liquids, natural gas.
Ohio	302, 612	292, 689	[1] 302, 242	293, 659	12	2. 09	Coal, stone cement, lime.
Oklahoma	607, 486	621, 351	[1] 679, 003	650, 153	5	4. 63	Petroleum, natural gas, natural-gas liquids, coal.
Oregon	28, 402	26, 674	24, 449	32, 268	38	. 23	Sand and gravel, stone, cement, diatomite.
Pennsylvania	1, 289, 226	1, 145, 633	1, 121, 622	926, 280	4	6. 60	Coal, cement, stone, natural gas.
Rhode Island	1, 278	1, 250	1, 462	1, 461	47	. 01	Sand and gravel, stone, graphite.
South Carolina	11, 444	14, 686	17, 771	17, 744	43	. 13	Cement, clays, stone, sand and gravel.
South Dakota	29, 652	30, 445	[1] 33, 823	37, 859	37	. 27	Gold, sand and gravel, stone, cement.
Tennessee	100, 047	100, 932	98, 050	105, 686	27	. 75	Coal, stone, cement, phosphate rock.
Texas	3, 269, 199	3, 379, 813	3, 647, 913	3, 730. 162	1	26. 58	Petroleum, natural gas, natural-gas liquids, sulfur.
Utah	257, 145	265, 501	298, 629	255, 234	16	1. 82	Copper, coal, iron ore, molybdenum.
Vermont	18, 516	17, 891	20, 302	20, 483	41	. 15	Stone, slate, asbestos, copper.
Virginia	164, 252	164, 679	152, 979	129, 603	23	. 92	Coal, stone, cement, sand and gravel.
Washington	54, 554	56, 139	54, 577	53, 300	33	. 38	Cement, sand and gravel, stone, zinc.
West Virginia	941, 748	825, 733	790, 110	636, 311	6	4. 53	Coal, natural gas, stone, petroleum.
Wisconsin	48, 350	55, 710	[1] 55, 212	54, 286	32	. 39	Sand and gravel, stone, iron ore, cement.
Wyoming	204, 357	206, 828	255, 906	281, 306	13	2. 00	Petroleum, coal, clays, sodium salts.
Total	13, 529, 000	13, 392, 000	[1] 14, 388, 000	14, 033. 000		100. 00	Petroleum, coal, natural gas, cement.

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[1] Revised figure.

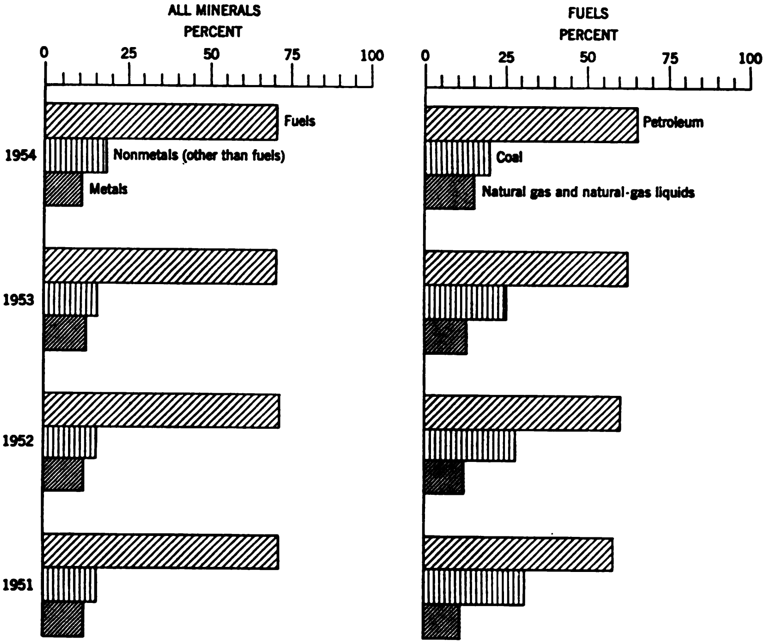

FIGURE 2.—Value of mineral production in continental United States, 1951–54, by mineral groups and by mineral fuels, in percent.

TABLE 4.—Comparison of world and United States production of mineral fuels, 1953–54

[Compiled under the supervision of Berenice B. Mitchell of the Division of Foreign Activities, Bureau of Mines]

Mineral	1953 (thousand short tons)			1954 (thousand short tons)		
	World	United States	Percent of world	World	United States	Percent of world
Coal:						
Bituminous [1]	1,512,700	454,439	30	1,482,900	387,463	26
Lignite	495,000	2,851	(2)	517,000	4,243	(2)
Pennsylvania anthracite	151,300	30,949	20	152,100	29,083	19
Coke (excluding breeze):						
Gashouse	[3] 46,500	237	(2)	[3] 47,000	256	(2)
Oven and beehive	248,000	78,837	32	232,000	59,662	26
Fuel briquets and packaged fuel	118,000	1,860	2	117,000	1,701	1
Natural gas million cubic feet	(4)	8,396,916	(4)	(4)	8,742,546	(4)
Peat	59,000	204	(2)	59,000	243	(2)
Petroleum (crude) thousand barrels	4,770,779	2,357,082	49	4,990,899	2,316,323	46

[1] Including Alaska.
[2] Less than 1 percent.
[3] Includes low- and medium-temperature and gashouse coke.
[4] Data not available.

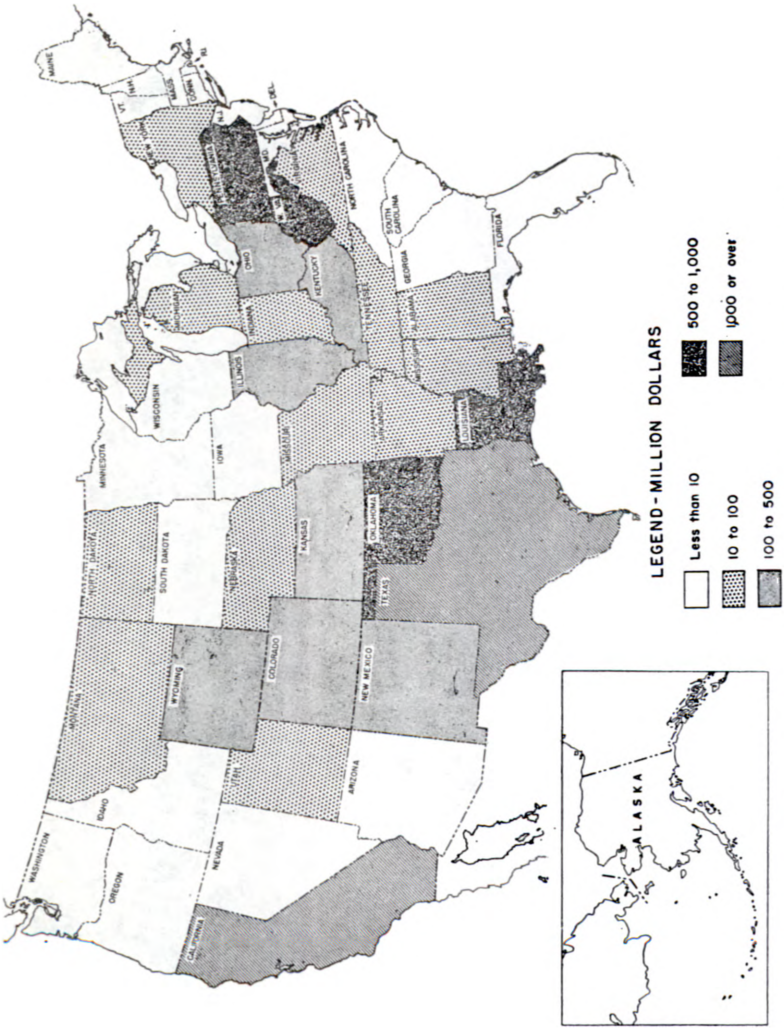

FIGURE 3.—Value of mineral-fuels production in continental United States and Alaska, 1954, by States

Employment and Injuries in the Fuel Industries

By John C. Machisak

◆

INTRODUCTION

THIS CHAPTER of the Minerals Yearbook contains injury-experience and related employment data for the coal-mining, coking, and oil and gas industries for 1954. Inasmuch as the inherent accident hazards for each of the three sections are not comparable, no attempt has been made to combine data to present an overall experience for the fuel section of the mineral industries; therefore, each industry is treated separately. The injury and employment records for the mineral industry as a whole are covered by tabulations and discussions in volume III.

COAL

The overall injury experience (fatal and nonfatal) at the Nation's coal mines was more favorable in 1954 than in the preceding year. The number of injuries, both fatal and nonfatal, was considerably less than in 1953, and the resulting injury-frequency rate per million man-hours worked dropped from 48.13 to 46.69, or 3 percent, thus establishing a new low record for the coal-mining industry.

The total number of fatalities resulting from accidents, which were determined to be chargeable to the coal-mining industry, was 396—the lowest number recorded for any 1 year in a statistical history of the industry, covering almost three-quarters of a century. However, despite this commendable saving of life, the rate at which the deaths occurred was unfavorable. In 1953 the fatality rate—a record low—was 0.90 per million man-hours of worktime or exposure to the hazards of the industry, whereas in 1954 the rate was 1.02—an increase of 13 percent. This increase in the fatality rate was, however, due entirely to a 24-percent decrease in manpower activity. The total worktime dropped from 513.6 million man-hours in 1953 to 388.0 million man-hours in 1954.

One major disaster (a single accident in which 5 or more men are killed) occurred in a West Virginia mine as the result of an explosion; 15 underground employees and 1 surface employee were killed.

The decrease in the number of deaths in the industry was effected entirely in underground workings, where chances of death from accidents are potentially higher than in any other phase of the industry.

Accidents at surface works connected with underground mines resulted in one more death than during 1953. Fatalities associated with strip-pit operations increased from 21 in 1953 to 22 in 1954. The number of nonfatal injuries, or those involving loss of time beyond the day on which the injuries occurred was 17,718—27 percent less than in 1953.

Employment showed a decided decrease in 1954; an average of 283,700 men was working daily, or 19 percent less than the average daily working force in 1953. Because of the decline in the number of men working, the total worktime (man-hours) decreased 24 percent during 1954. The average miner worked a 7.82-hour shift and accumulated 1,367 hours of work in 1954.

TABLE 1.—Employment and injury experience at coal mines in the United States, 1950–54

Industry and year	Average men working daily[1]	Average active mine-days[2]	Million man-days worked	Million man-hours worked	Number of injuries		Frequency rates per million man-hours	
					Fatal	Nonfatal	Fatal	Nonfatal
Bituminous-coal mines:[3]								
1950	408,623	185	75.5	594.8	550	28,390	0.92	47.73
1951	372,138	201	74.9	590.4	684	28,081	1.16	47.56
1952	338,719	186	63.0	497.9	449	23,719	.90	47.64
1953	295,425	191	56.3	444.3	397	20,112	.89	45.26
1954	241,919	177	42.8	337.7	334	14,746	.99	43.66
Anthracite mines:								
1950	74,616	211	15.7	116.6	93	8,874	.80	76.14
1951	69,767	207	14.5	106.8	101	7,472	.95	69.94
1952	62,610	207	13.0	95.8	99	6,355	1.03	66.35
1953	55,701	169	9.4	69.3	64	4,146	.92	59.85
1954	41,786	164	6.8	50.2	62	2,972	1.23	59.18
Total coal mines:								
1950	483,239	189	91.2	711.4	643	37,264	.90	52.38
1951	441,905	202	89.4	697.2	785	35,553	1.13	50.99
1952	401,329	189	76.0	593.7	548	30,074	.92	50.66
1953	351,126	187	65.7	513.6	461	24,258	.90	47.23
1954	283,705	175	49.6	388.0	396	17,718	1.02	45.67

[1] Average number of men at work each day mine was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than number of men available for work, as measured by a account of names on payroll.

[2] Average in which operating time of each mine is weighted by average number of workers in mines.

[3] Includes lignite.

Bituminous-Coal Mines.—The safety record of the bituminous-coal-mining industry continued to improve in 1954, when it was the lowest of any year since complete injury data became available in 1930. The rate of 44.65 injuries (fatal and nonfatal) per million man-hours for the industry was 3 percent lower than the rate of 46.15 for 1953. In all, 334 men were killed at bituminous-coal mines during 1954, at the frequency rate of 0.99 per million man-hours, which was 11 percent higher than the alltime low fatality rate of 0.89 established in 1953; however, the number of fatalities in 1954 was the lowest in the statistical history of the bituminous-coal-mining industry. Of the 334 fatalities, 291 were underground, 27 at surface operations operated in connection with underground mines, and 16 at strip-pit operations. The principal causes of underground accidents (roof falls and haulage) resulted in fewer deaths in 1954. However, the number of fatal injuries from explosions, explosives, and machinery increased. It is gratifying to report that the number of fatal injuries from falls of roof, rib, or face, the greatest single cause of underground fatalities, dropped 24 percent; there were 177 in 1954 as compared with 233 in 1953, or 56 fatalities less. Underground haulage accidents caused the death of 66 men in 1954 and 78 in 1953, a decrease of 12. One major disaster (a single accident in which 5 or more men are killed) occurred in 1954, a gas and dust explosion that resulted in the death of 16 men.

The average number of men working daily at bituminous-coal mines in 1954 was 241,900, an 18-percent decline from the 1953 average employment of 295,400 men. The average number of days of employment per man declined from 191 in 1953 to 177 in 1954—a decrease of 14 days of employment per man. The total man-hours of worktime declined 24 percent, which resulted in a workyear of 1,396 hours—108 hours of work per man less than in 1953.

Anthracite Mines.—The injury rate per million man-hours (fatal and nonfatal) at Pennsylvania anthracite mines declined less than 1 percent in 1954. The combined injury rate was 60.41 in 1954 and 60.77 in 1953. A total of 62 fatalities occurred at anthracite mines in 1954—a decrease of 2 from the previous year. The fatality rate per million man-hours in 1954 (1.23) was increased 34 percent over that in 1953 (0.92). In all, 2,972 nonfatal lost-time injuries occurred, at the rate of 59.18 per million man-hours, which was slightly lower than in 1953. No major disaster occurred in this segment of the coal-mining industry during the year.

Fatal accidents at anthracite mines caused the death of 62 men—51 underground, 5 at surface operations operated in connection with underground mines, and 6 at strip mines. Falls of roof, face, or rib killed 39 men, a decline of 4 from the previous year. Only 1 death resulted from explosions—4 less than in the previous year. Haulage accidents underground were credited with the only increase over the previous year, causing six more deaths in 1954 than in 1953. Falls of roof, face, or rib, and haulage accidents were the chief sources of fatal injuries at underground anthracite mines and caused 47 (92 percent) of the 51 fatal injuries underground.

Employment at Pennsylvania anthracite mines continued to decline in 1954. An average daily working force of 41,786 men worked 164 days, accumulating 50,222 thousand man-hours. This was a 25-percent decline in the average number of men working daily and a 28-percent drop in the total man-hours of employment from that in 1953. Each employee had an average of 1,202 man-hours of work during the year, or 42 hours less per man than in 1953.

COKE

The coke-manufacturing industry continued to improve its safety record, with a combined (fatal and nonfatal) injury-frequency rate of 4.99 per million man-hours of worktime for 1954, against a corresponding rate of 6.69 for the previous year, as shown by reports for the 21,299 active beehive and byproduct coke ovens. Reports received by the Bureau of Mines indicate a 19-percent reduction in the number of man-hours worked, as well as an 18-percent decrease in the number of employees working. The average days worked during the year were approximately the same, with an 8-hour shift. The average worker accumulated 2,732 hours of worktime—27 hours less than during the previous year.

Byproduct-Coke Plants.—There were 8 fatalities and 245 nonfatal disabling injuries at byproduct ovens in 1954—a 26-percent reduction in the number of fatal and nonfatal injuries. The combined rate (fatal and nonfatal) of 4.88 was 12 percent lower than the corresponding rate of 5.56 reported for 1953. There were 341 fewer ovens operated in 1954 than in 1953, and the average daily working force and number of man-hours worked each declined 15 percent. Production dropped 20 percent, while the average employee at byproduct plants worked an 8-hour shift and accumulated 2,887 hours of worktime. Byproduct ovens operated 1 day more than in 1953.

Beehive-Coke Ovens.—The beehive-coke industry again operated with a fatality-free record and reported only nine nonfatal injuries. An injury-frequency rate of 13.40 per million man-hours of worktime was 48 percent lower than in the previous year. The number of ovens operated in the beehive-coke industry for 1954 was 50 percent lower than in the previous year, and the number of workers reported declined 48 percent. Production in 1954 was 628,600 tons—a reduction of over 4 million tons from the 1953 total. The man-hours of worktime declined from 3.6 million hours in 1953 to 671,000 in 1954. The number of days active was 130 less, with each worker accumulating only 531 hours during the year, and working a 7.46-hour shift.

TABLE 2.—Employment and injury experience at coke plants in the United States, 1950–54

Industry and year	Average men working daily [1]	Average active plant days [2]	Million man-days worked	Million man-hours worked	Number of injuries		Frequency rates per million man-hours	
					Fatal	Nonfatal	Fatal	Nonfatal
Byproduct ovens:								
1950	20,942	362	7.6	60.6	13	516	0.21	8.52
1951	22,058	363	8.0	64.1	9	533	.14	8.31
1952	21,919	336	7.4	58.6	7	420	.12	7.16
1953	21,011	362	7.6	61.1	8	332	.13	5.43
1954 [3]	17,944	361	6.5	51.8	8	245	.15	4.73
Beehive ovens:								
1950	3,405	210	.7	5.3	1	264	.19	50.11
1951	3,657	228	.8	6.1	1	235	.16	38.60
1952	3,322	170	.6	4.2	1	126	.24	30.29
1953	2,429	201	.5	3.6	--------	93	--------	25.98
1954 [3]	1,265	71	.1	.7	--------	9	--------	13.40
All ovens:								
1950	24,347	341	8.3	65.9	14	780	.21	11.84
1951	25,715	344	8.8	70.2	10	768	.14	10.94
1952	25,241	315	7.9	62.8	8	546	.13	8.69
1953	23,440	345	8.1	64.7	8	425	.12	6.57
1954 [3]	19,209	342	6.6	52.5	8	254	.15	4.84

[1] Average number of men at work each day oven was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than the number of men available for work, as measured by a count of names on payroll.

[2] Average in which operating time of each plant is weighted by average number of workers in the plant.

[3] Revised.

NOTE: All data are final.

OIL AND GAS

The injury experience of the oil and gas industry in 1954 was the best for the 13-year period in which the Bureau of Mines has collected statistics. The combined frequency rate (fatal and nonfatal) of 10.51 injuries per million man-hours was 9 percent lower than in 1953, and the severity rate of 1.04 days lost per 1,000 hours worked showed a 23-percent reduction from the previous year. A total of 122 fatal and permanent total injuries was reported and 548 permanent partial and 12,248 temporary disabilities. Compared with 1953, injuries occurred less frequently in all parts of the industry except exploration and miscellaneous and were less severe than in all except production and miscellaneous. The greatest improvement in injury frequency was in drilling, although it maintained a higher rate than any other segment of the industry.

A total of 580,800 employees worked an average of 2,116 hours each—an average of 11 hours less than in 1953.

TABLE 3.—Employment and injury experience in the oil and gas industry of the United States, 1950–54

Year	Average men working daily	Million man-hours worked	Number of injuries		Frequency rates per million man-hours	
			Fatal	Nonfatal	Fatal	Nonfatal
1950	517.787	1,082	109	13,500	0.10	12.48
1951	539,095	1,148	142	15,130	.12	13.18
1952 [1]	586,138	1,228	150	15,465	.12	12.59
1953 [1]	594,398	1,264	179	14,452	.14	11.43
1954 [1]	580,783	1,229	122	12,796	.10	10.41

[1] Fatal and permanent total injuries combined.

CONCLUSION

The coal-mining, beehive- and byproduct-coking, and oil and gas industries all recorded new low overall frequency rates in 1954. Each industry established the best safety record since data on injuries have been compiled by the Bureau of Mines. This reduction in injury frequency resulted in approximately 8,500 fewer disabling injuries in 1954 than in 1953.

PART II. COMMODITY REVIEWS

A. Coal and Related Products

Coal—Bituminous and Lignite

By W. H. Young, R. L. Anderson, and E. M. Hall

◆

GENERAL SUMMARY

MOST OF THE key items in the bituminous-coal and lignite industry declined in 1954 compared with 1953. Production, consumption, exports, average value per ton, men working, and days worked all declined; however, in the field of mechanization, the percentages mechanically loaded, mechanically cleaned, mined by auger, and mined by stripping all increased, as did production per man per day.

Production.—The output of soft coal in 1954—391.7 million tons—was 14 percent less than the 457.3 million tons produced in 1953. The lower production in 1954 was due largely to a sharp reduction in consumption in the United States and to a drop in exports.

Production fluctuated less during 1954 than it had for many years. There was only a slight seasonal variation in the spring, and the only major fluctuation resulted from the miners' vacation period of 10 days in midsummer. Time lost on account of strikes were the smallest since 1938—according to the Bureau of Labor Statistics, 344,000 man-days.

Trend of Employment.—The continued decrease in employment was due both to the drop in production and to the increased output per man per day in 1954 compared with 1953. The average number of men working daily at bituminous-coal and lignite mines decreased from 293,000 in 1953 to 227,000 in 1954.

Index to Capacity.—As it is impossible for all mines to operate every working day in the year, a conservative figure of 280 days for calculating potential capacity was suggested some years ago by the coal committee of the American Institute of Mining and Metallurgical Engineers. (See Minerals Yearbook, 1935, pp. 631–632.) The average output per day worked in 1954 was 2.2 million tons, which (if applied to 280 days) gives an annual potential output of 603 million tons compared with the actual production of 391.7 million tons.

Mechanization.—A greater proportion—80 percent—of coal was loaded mechanically at underground mines in the United States in 1954 than in any other year. Sales of continuous mining machines increased 50 percent over the previous year, and production at auger mines almost doubled.

Mechanical Cleaning.—Approximately 60 percent of the soft coal mined in the United States in 1954 was mechanically cleaned. A large portion of the remaining 40 percent was hand-picked and screened into various sizes at tipples with no mechanical cleaning facilities.

Consumption.—Consumption of bituminous coal and lignite in the United States declined sharply—15 percent—in 1954 from the previous year. All classes of consumers except electric power utilities used less coal in 1954. Table 53 shows trends in consumption for the major classes of consumers for 1933 to 1954.

Trends of Fuel Efficiency.—As for many years past, electric public-utility power plants chalked up new records in fuel efficiency; the poundage of coal per kilowatt-hour in 1954 was slightly less than 1.

Competition From Oil and Gas.—Soft coal continued to meet serious competition from oil and gas. The relative rate of growth of coal, petroleum, natural gas, and water-power, 1900–54, is shown graphically in figure 15. As a percentage of total energy, bituminous coal and lignite represented the smallest proportion of total energy in their history, while both petroleum and natural gas represented a higher proportion than ever before.

Electric-power utilities consumed 3 percent more bituminous coal and 13 percent more gas in 1954 than in 1953. Nineteen percent less fuel oil was consumed in 1954 than in 1953.

Class I railroads decreased their consumption of coal 37 percent in 1954 from 1953 and their purchases of fuel oil and diesel fuel 9 percent during the same period.

Stocks.—The reserve supply of bituminous coal and lignite in the hands of industrial consumers and retail coalyards decreased from 80.6 million tons at the beginning of 1954 to 69.2 million tons at the close. The days' supply of stocks decreased from 64 to 60. Stocks

TABLE 1.—Salient statistics of the bituminous-coal and lignite industry in the United States, 1953–54

(All tonnage figures represent net tons)

	1953	1954	Change from 1953 (percent)
Production ... net tons	457, 290, 449	391, 706, 300	−14.3
Consumption in the United States ... do	426, 798, 000	363, 060, 000	−14.9
Stocks at end of year:			
Industrial consumers and retail yards ... do	80, 614, 000	69, 201, 000	−14.2
Stocks on upper Lake docks ... do	4, 750, 546	4, 332, 436	−8.8
Imports and exports:[1]			
Imports ... do	226, 900	198, 799	−12.4
Exports ... do	33, 760, 263	31, 040, 564	−8.1
Price indicators (average per net ton):			
Average cost of railroad fuel purchased, f. o. b. mines[2]	$4.77	$4.60	−3.6
Average cost of coking coal at merchant coke ovens	$10.01	$9.57	−4.4
Average retail price[3]	$14.95	$14.94	−.1
Average railroad freight charge per net tons[2]	$3.33	$3.23	−3.0
Average value f. o. b. mines	$4.92	$4.52	−8.1
Equipment sold:			
Mobile loading machines	180	92	−48.9
Continuous mining machines	67	101	+50.7
Augers	57	55	−3.5
Scrapers	11	5	−54.5
Shuttle cars	437	242	−44.6
Conveyors:			
"Mother"	58	19	−67.2
Room or transfer	87	61	−29.9
Face	49	115	+134.7
Method of mining:			
Hand-loaded underground ... net tons	71, 221, 990	46, 142, 382	−35.2
Mechanically loaded underground ... do	278, 328, 982	242, 969, 649	−12.7
Mined at auger mines ... do	2, 290, 908	4, 460, 019	+94.7
Mined by stripping ... do	105, 448, 569	98, 134, 250	−6.9
Mechanically cleaned ... do	241, 758, 577	232, 764, 023	−3.7
Number of mines	6, 671	6, 130	−8.1
Average number of days worked	191	182	−4.7
Average number of men working daily	293, 106	227, 397	−22.4
Production per man per day ... net tons	8.17	9.47	+15.9
Fuel-efficiency indicator: Pounds of coal per kilowatt-hour at electric power plants[4]	1.06	0.99	−6.6

[1] U. S. Department of Commerce.

[2] Interstate Commerce Commission.

[3] Bureau of Labor Statistics, U. S. Department of Labor.

[4] Federal Power Commission.

on the upper Lake docks decreased 418,110 tons from January 1 to December 31, 1954.

SCOPE OF REPORT

As in previous years, these data include all coal produced in Alaska and in the United States except Pennsylvania anthracite. The production in Alaska is included in the total production of the United States.

Throughout this chapter all tonnage figures represent net tons of marketable coal and exclude washery and other refuse. The unit of measurement is the net (short) ton of 2,000 pounds.

The statistics for 1954 are final and are based upon detailed annual reports of production and mine operation furnished by the producers. All but a small percentage of the output was covered by the reports submitted. For the remaining production not directly reported, which consisted chiefly of output of small mines, it has been possible to obtain reasonably accurate data from the records of the various State mine departments, which have statutory authority to require such reports, or, in a few instances, from railroad carloadings. Thus, the report represents complete coverage of all mines having an output of 1,000 tons a year or more. The report does not attempt to include many small mines that produce less than 1,000 tons a year. However, for 1954 the Bureau of the Census included reports from 643 of these small mines, whose production amounted to 365,908 tons, or less than 0.1 percent of the total United States production.

Comparability of 1954 Figures With Previous Years.—The annual canvass of bituminous coal and lignite mines for 1954 was conducted in cooperation with the United States Bureau of the Census as a part of the Census of Mineral Industries for 1954. The drafting of schedules and statistical procedures, the editing of reports, and the classification of data accorded with standards established by the Bureau of the Census. As a result of this cooperative arrangement, some items for 1954 are not strictly comparable with those for previous years.

The first instance of lack of comparability was in the definition of a mine. The Bureau of the Census defined a mine as "a working or group of workings at a given locality in which operations are conducted as a unit or are unified by common management or joint handling of some part of the mining or preparation process. Individual shafts, openings, or sites should not necessarily be considered as individual mines." The Bureau of Mines has considered individual shafts, openings, or sites as individual "mines."

There also is lack of comparability in items on employment, days worked, man-days, and output per man per day. The Bureau of the Census excluded working proprietors while the Bureau of Mines in previous years included owners, operators, or partners performing manual labor.

The joint 1954 report form requested information on loading machines "in use or available for use at the end of 1954." If a mine operated for only part of the year and was closed permanently and dismantled at the end of the year, no equipment was tabulated for that mine. The Bureau of Mines, in previous years, requested information on the number of machines in use during the period when the mine was in operation.

RESERVES[1]

TABLE 2.—Coal reserves of the United States, January 1, 1953, by States

(In million short tons)

State	Estimated original reserves					Reserves depleted to Jan. 1, 1953		Remaining reserves Jan. 1, 1953	Recoverable reserves Jan. 1, 1953, assuming 50-percent recovery
	Bituminous coal	Subbituminous coal	Lignite	Anthracite and semianthracite	Total	Production[1]	Production plus loss in mining, assuming past losses equal production		
Alabama[2]	67,570				67,570	861	1,722	65,848	32,924
Arkansas	1,396		90	230	1,716	94	188	1,528	764
COLORADO[3]	90,258	9,437		713	100,408	484	968	99,440	49,719
GEORGIA	100				100	12	24	76	38
ILLINOIS	[4] 137,321				[4] 137,321	[5] 156	[5] 312	137,009	68,504
INDIANA	37,293				37,293	1,039	2,078	35,215	17,607
Iowa	29,160				29,160	348	696	28,464	14,232
KANSAS	[4] 20,774		(6)		20,774	[5] 6	[5] 12	20,762	10,381
Kentucky	123,327				123,327	2,177	4,354	118,973	59,487
MARYLAND	[4] 1,200				[4] 1,200	[5] 2	[5] 4	1,196	598
MICHIGAN	297				297	[7] 46	[8] 77	220	110
Missouri	79,362				79,362	267	534	78,828	39.414
MONTANA	2,363	132,151	87,533		222,047	164	328	221,719	110,860
NEW MEXICO	10,948	50,801		6	61,755	123	246	61,509	30,754
NORTH CAROLINA	112				112	1	2	110	55
NORTH DAKOTA			350,910		350,910	77	154	350,756	175,378
Ohio	86,584				86,584	1,806	3,612	82,972	41,486
Oklahoma	54,951				54,951	166	332	54,619	27,309
PENNSYLVANIA	75,093			22,805	97,898	12,761	25,522	72,376	36,189
SOUTH DAKOTA			2,033		2,033	1	2	2,031	1,015
Tennessee	25,665				25,665	340	680	24,985	12,493
Texas	8,000		23,000		31,000	62	124	30,876	15,438
Utah	88,184	5,156			93,340	218	436	92.904	46,452
VIRGINIA	11,696			355	12,051	609	1,218	10,833	5,417
Washington	11,413	52,442		23	63,878	145	290	63,588	31,794

WEST VIRGINIA	116,618	----------	----------	----------	116,618	5,428	10,856	105,762	52,881
WYOMING	13,235	[9] 108,319	(9)	----------	121,554	383	766	120,788	60,395
Other States	[10] 820	[11] 15,500	[12] 50	----------	16,370	9	18	16,352	8,176
Total	1,093,740	373,806	463,616	24,132	1,955,294	[13] 27,785	55,555	1,899,739	949,870

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[1] Production, 1800–85, from Eavenson, H. N., The First Century and a Quarter of American Coal Industry, date of publication, Pittsburgh, 1942; production, 1886–1952, from Geol. Survey Mineral Resources volumes and Bureau of Mines Minerals Yearbooks unless otherwise indicated.

[2] Reserve estimates of States in lower case letters were prepared by, or under the direction of, M. R. Campbell before 1928.

[3] Reserve estimates of States in capital letters supersede earlier estimates by M. R. Campbell.

[4] Remaining reserves, January 1, 1950.

[5] Production, 1950 through 1952.

[6] See discussion in text.

[7] Production, 1860–1949, Michigan Geological Survey Division, as cited in Cohn, G. V., Burus, R. N., Brown, Andrew, Brant, R. A., and Wright, Dorothy, Coal Resources of Michigan: Geol. Survey Circ. 77, 1950, p. 56.

[8] Past losses assumed to be 40 percent of coal originally in the ground.

[9] Small reserves and production of lignite included under subbituminous coal.

[10] Includes Arizona, California, Idaho, and Oregon.

[11] Includes Arizona, California, and Oregon.

[12] Includes California and Louisiana.

[13] Somewhat less than total recorded production. See footnote 5.

THICKNESS OF BITUMINOUS-COAL AND LIGNITE SEAMS

The overall operating efficiency in bituminous-coal mining is affected by many physical conditions, such as the thickness and character of the coal seam, the dip or pitch of the seam, the depth of cover, the character of the roof and overlying strata, and mine water. Of these, the thickness of the coal seam is one of the more important items in determining the results achieved.

The Bureau of Mines has compiled and published detailed data on thickness of seams for coal mined in 1945 [2] and 1950.[3] An earlier study, based on data collected by the United States Coal Commission, was made on thickness of seams in 1920.[4] In the past 30 years the average seam thickness has not changed materially. The average thickness of all bituminous coal and lignite mined in 1920 was 63 inches; in 1945, 65 inches; and in 1950, 63 inches. As thick seams have been exhausted in the older fields, other thick seams have been opened in the newer fields.

Because of the importance of seam thickness in mining operations, the data for 1950, the latest year available, are summarized here. A coal seam of moderate thickness presents the least mining difficulties. Any decided thinning limits production, decreases recovery, and therefore increases cost. Thickening of the seam in underground mining has the same effect; for, as the seam increases in thickness, it becomes necessary to maintain larger pillars, timbering becomes more difficult and finally impracticable, and roof control is almost impossible. The limited information available indicates that, for maximum recovery in underground bituminous-coal mines, the ideal thickness of seams lies between 6 and 8 feet.

The 1950 data included in the following tables were compiled from annual reports of production and mine operation submitted by bituminous-coal and lignite producers to the Bureau of Mines. Estimates were made for seam thickness not specified by the producer. These estimates did not materially affect the accuracy of the final results.

Bituminous coal and lignite are mined today from seams of exceedingly variable thickness—varying from less than 2 to over 50 feet; however, a large majority of the mines produce coal from seams 3 to 6 feet thick. Table 3 presents the number of mines and production in 1950, classified by thickness. Figures are also shown separately for underground and strip mines. Coal near the surface in relatively thin seams that are not suited to underground mining frequently can be recovered by stripping. In 1950, 17 percent of strip production came from seams less than 3 feet thick, whereas only 5 percent of the underground production came from seams less than 3 feet thick.

The average thickness of seam mined varied widely, ranging from 19.2 feet in Wyoming to 1.5 in Georgia. Figure 1 shows the percentage of bituminous coal produced, by thickness of seams mined, in the 10 largest coal-producing States and the United States total in 1950.

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[2] Young, W. H., and Anderson, R. L., Thickness of Bituminous-Coal and Lignite Seams Mined in the United States in 1945: Bureau of Mines Inf. Circ. 7442, 1947, 17 pp.

[3] Young, W. H., and Anderson, R. L., Thickness of Bituminous-Coal and Lignite Seams at All Mines, and Thickness of Overburden at Strip Mines in the United States in 1950: Bureau of Mines Inf. Circ. 7642, 1952, 18 pp.

[4] Hotchkiss, W. E., Warner, C. K., Plein, L. N., Dake, W. M., Anderson, R. L., Gallagher, J. J., and Schoenfeld, M. H., Mechanization, Employment, and Output per Man in Bituminous-Coal Mining: Work Projects Administration. National Research Project, vol. 1, 1939, p. 62.

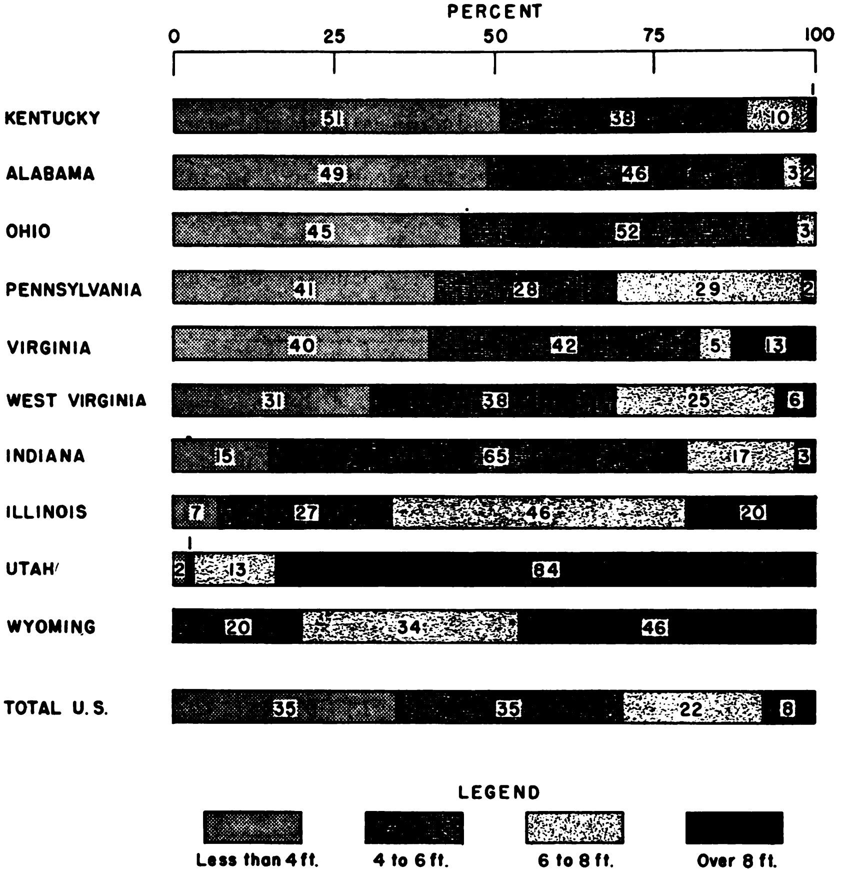

FIGURE 1.—Percentage of bituminous coal and lignite produced in the 10 largest coal-producing States and total United States, 1950, by thickness of seams mined.

TABLE 3.—Number and production of bituminous-coal and lignite mines in the United States, 1950, classified by thickness of seams mined

Thickness of seams mined (feet)	Underground mines				Strip mines				Total—all mines			
	Mines		Production		Mines		Production		Mines		Production	
	Number	Percent	Thousand net tons	Percent	Number	Percent	Thousand net tons	Percent	Number	Percent	Thousand net tons	Percent
Less than 2	55	0.7	678	0.2	83	4.4	3,199	2.6	138	1.5	3,877	0.8
2 to 3	904	12.0	17,790	4.5	387	20.7	17,869	14.5	1,291	13.7	35,659	6.9
3 to 4	3,960	52.4	108,412	27.6	607	32.5	31,922	25.8	4,567	48.4	140,334	27.2
4 to 5	1,272	16.8	77,471	19.7	311	16.6	30,987	25.1	1,583	16.8	108,458	21.0
5 to 6	542	7.2	58,990	15.0	202	10.8	16,125	13.1	744	7.9	75,115	14.5
6 to 7	386	5.1	63,080	16.1	139	7.4	13,360	10.8	525	5.6	76,440	14.8
7 to 8	207	2.7	33,504	8.5	43	2.3	1,506	1.2	250	2.6	35,010	6.8
8 and over	233	3.1	32,919	8.4	98	5.3	8,499	6.9	331	3.5	41,418	8.0
Total	7,559	100.0	392,844	100.0	1,870	100.0	123,467	100.0	9,429	100.0	516,311	100.0

The States are arranged in order of the percentage of output mined from seams less than 4 feet thick. Table 4 gives details by States for strip and underground mines separately. Although there was considerable variation in thickness of seams at strip and underground mines, the strip mines generally operated in thinner seams. Strip mining was carried on in 11 States in coal seams having average thicknesses less than those in the deep mines in the same States. These 11 States produced 70 percent of the total strip output in 1950.

TABLE 4.—Production and average thickness of seams mined at strip and underground bituminous-coal and lignite mines in the United States, 1950, by States

(Exclusive of mines producing less than 1,000 tons)

State	Strip mines		Underground mines		Total, all mines	
	Production (net tons)	Average thickness coal mined (feet)	Production (net tons)	Average thickness coal mined (feet)	Production (net tons)	Average thickness coal mined (feet)
Alabama	1,888,038	3.3	12,533,772	4.1	14,421,810	4.0
Alaska	130,737	3.2	281,718	4.8	412,455	4.3
Arizona	----------	----------	4,446	5.5	4,446	5.5
Arkansas	504,946	5.7	664,122	2.5	1,169,068	3.9
California (lignite)	(1)	----------	----------	----------	(1)	----------
Colorado	406,713	8.3	3,851,787	7.4	4,258,500	7.5
Georgia	----------	----------	18,000	1.5	18,000	1.5
Illinois	17,612,423	5.0	38,678,498	7.1	56,290,921	6.4
Indiana	10,739,567	4.4	9,217,462	5.8	19,957,029	5.0
Iowa	1,190,511	4.9	700,900	4.4	1,891,411	4.7
Kansas	2,024,352	1.9	100,628	2.8	2,124,980	1.9
Kentucky	13,977,643	5.3	64,517,960	4.1	78,495,603	4.4
Maryland	161,054	4.7	486,869	4.4	647,923	4.5
Michigan	----------	----------	11,500	2.5	11,500	2.5
Missouri	2,635,424	3.3	327,657	3.2	2,963,081	3.2
Montana:						
Bituminous	1,708,149	23.0	759,887	5.7	2,468,036	17.7
Lignite	(1)	----------	(1)	----------	52,130	16.6
Total Montana	1,717,179	22.9	802,987	6.3	2,520,166	17.6
New Mexico	----------	----------	726,958	5.3	726,958	5.3
North Carolina	----------	----------	(1)	----------	(1)	----------
North Dakota (lignite)	2,828,056	9.4	432,917	16.7	3,260,973	10.4
Ohio	22,775,193	3.8	14,985,898	4.7	37,761,091	4.2
Oklahoma	1,727,174	2.1	951,397	3.6	2,678,571	2.7
Oregon	----------	----------	1,384	7.5	1,384	7.5
Pennsylvania	26,426,597	3.7	79,443,524	5.3	105,870,121	4.9
South Dakota (lignite)	34,989	4.5	1,211	6.5	36,200	4.6
Tennessee	584,066	2.9	4,485,734	3.9	5,069,800	3.8
Texas (lignite)	18,169	12.0	----------	----------	18,169	12.0
Utah	----------	----------	6,669,896	11.5	6,669,896	11.5
Virginia	1,565,646	6.1	16,101,001	4.8	17,666,647	4.9
Washington	70,540	7.0	803,449	5.7	873,989	5.8
West Virginia	12,986,154	5.5	131,129,529	5.1	144,115,683	5.1
Wyoming	1,458,899	38.3	4,889,350	13.5	6,348,249	19.2
Other States	11,524	10.2	67,035	12.5	26,429	3.5
Total	123,466,564	5.1	392,844,489	5.4	516,311,053	5.3

[1] Included in "Other States" to avoid disclosure.

DOMESTIC PRODUCTION

The statistics in this report combine bituminous coal and lignite. Production figures for lignite are shown separately in table 62.

The production of bituminous coal and lignite has fluctuated widely from year to year; the chief causes have been market demand and strikes. The domestic market demand is influenced primarily by general industrial conditions, but in recent years exports have had considerable effect on total production. During the last two World Wars there was an extra-heavy demand for coal. Since 1930 production has fluctuated between a low of 310 million tons in 1932 to a high of 631 million tons in 1947—the highest production on record. The long-term trend in production, particularly since 1920, has been influenced very greatly by the inroads of competitive fuels and energy, such as oil, gas, and waterpower. Strikes, as mentioned above, are also a factor. The record of average days lost per man on strike from 1899 to 1954 is shown in table 14. Within the past 10 years man-days lost by strikes have fluctuated from a low of less than one-half million in 1954 to over 19 million in 1946.

The trend of average production of bituminous coal and lignite per working day in 1945–54 is illustrated in figures 2 and 5. Production, realization, capacity, and net income of bituminous-coal and lignite mines in 1905–54 are shown graphically in figure 3.

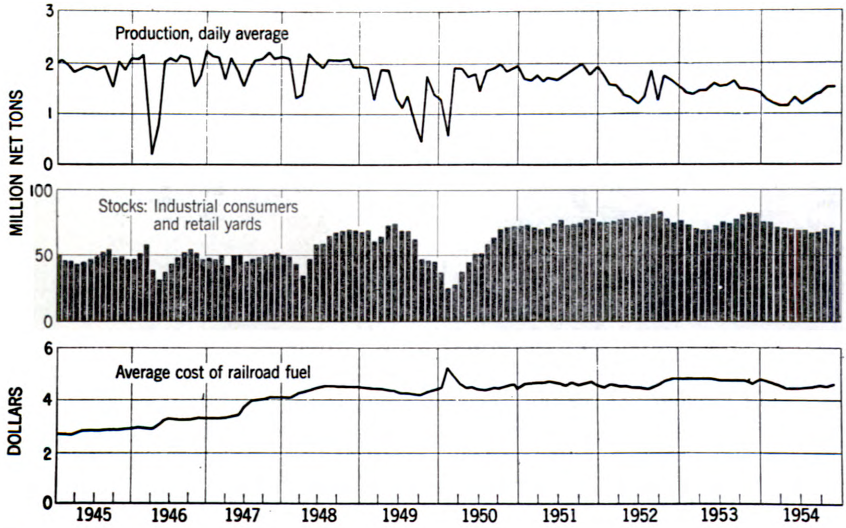

Figure 2.—Trends of production, stocks, and railroad-fuel prices of bituminous coal and lignite in the United States, 1945–54.

PRODUCTION BY MONTHS AND WEEKS

The figures on monthly and weekly production are estimates based upon (1) railroad carloadings of coal reported daily and weekly by all the important carriers, (2) shipments on the Allegheny and Monongahela Rivers reported by the United States Army Engineers, (3) direct reports from a number of mining companies, and (4) monthly production statements compiled by certain local operators' associations and State mine departments. In computing the estimates, allowance is made for commercial truck shipments, local sales, colliery fuel, and small truck mines producing over 1,000 tons a year. Preliminary estimates are made currently and published in the Weekly Coal Reports. These preliminary estimates have proved very reliable and for many years have been within approximately 1 percent of the final figure for total production, based upon complete coverage of all

TABLE 5.—Growth of the bituminous-coal- and lignite-mining industry in the United States, 1890–1954

Year	Production (net tons)	Value of production		Number of mines	Capacity at 280 days (million tons)	Foreign trade [1]	
		Total	Average per ton			Exports (net tons)	Imports (net tons)
1890	111, 302, 322	$110, 420, 801	$0. 99	(2)	137	1, 272, 396	1, 047, 416
1891	117, 901, 238	117, 188, 400	. 99	(2)	148	1, 651, 694	1, 181, 677
1892	126, 856, 567	125, 124, 381	. 99	(2)	162	1, 904, 556	1, 491, 900
1893	128, 385, 231	122, 751, 618	. 96	(2)	174	1, 986, 383	1, 234, 499
1894	118, 820, 405	107, 653, 501	. 91	(2)	196	2, 439, 720	1, 286, 268
1895	135, 118, 193	115, 779, 771	. 86	2, 555	196	2, 659, 987	1, 411, 323
1896	137, 640, 276	114, 891, 515	. 83	2, 599	202	2, 515, 838	1, 393, 095
1897	147, 617, 519	119, 595, 224	. 81	2, 454	213	2, 670, 157	1, 442, 534
1898	166, 593, 623	132, 608, 713	. 80	2, 862	221	3, 004, 304	1, 426, 108
1899	193, 323, 187	167, 952, 104	. 87	3, 245	230	3, 897, 994	1, 409, 838
1900	212, 316, 112	220, 930, 313	1. 04	(2)	255	6, 060, 688	1, 911, 925
1901	225, 828, 149	236, 422, 049	1. 05	(2)	281	6, 455, 085	2, 214, 507
1902	260, 216, 844	290, 858, 483	1. 12	(2)	316	6, 048, 777	2, 174, 393
1903	282, 749, 348	351, 687, 933	1. 24	(2)	350	5, 835, 561	4, 043, 519
1904	278, 659, 689	305, 397, 001	1. 10	4, 650	386	7, 206, 879	2, 179, 882
1905	315, 062, 785	334, 658, 294	1. 06	5, 060	417	7, 512, 723	1, 704, 810
1906	342, 874, 867	381, 162, 115	1. 11	4, 430	451	8, 014, 263	2, 039, 169
1907	394, 759, 112	451, 214, 842	1. 14	4, 550	473	9, 869, 812	1, 892, 653
1908	332, 573, 944	374, 135, 268	1. 12	4, 730	482	11, 071, 152	2, 219, 243
1909	379, 744, 257	405, 486, 777	1. 07	5, 775	510	10, 101, 131	1, 375, 201
1910	417, 111, 142	469, 281, 719	1. 12	5, 818	538	11, 663, 052	1, 819, 766
1911	405, 907, 059	451, 375, 819	1. 11	5, 887	538	13, 259, 791	1, 972, 555
1912	450, 104, 982	517, 983, 445	1. 15	5, 747	566	16, 475, 029	1, 456, 333
1913	478, 435, 297	565, 234, 952	1. 18	5, 776	577	18, 013, 073	1, 767, 656
1914	422. 703, 970	493, 309, 244	1. 17	5, 592	608	17, 589, 562	1, 520, 962
1915	442, 624, 426	502, 037, 688	1. 13	5, 502	610	18, 776, 640	1, 703, 785
1916	502, 519, 682	665, 116, 077	1. 32	5, 726	613	21, 254, 627	1, 713, 837
1917	551, 790, 563	1, 249, 272, 837	2. 26	6, 939	636	23, 839, 558	1, 448, 453
1918	579, 385, 820	1, 491, 809, 940	2. 58	8, 319	650	22, 350, 730	1, 457, 073
1919	465, 860. 058	1, 160, 616, 013	2. 49	8, 994	669	20, 113, 536	1, 011, 550
1920	568, 666, 683	2, 129, 933, 000	3. 75	8, 921	725	38, 517, 084	1, 244, 990
1921	415, 921, 950	1, 199, 983, 600	2. 89	8, 038	781	23, 131, 166	1, 257, 589
1922	422, 268, 099	1, 274, 820, 000	3. 02	9, 299	832	12, 413, 085	5, 059. 999
1923	564, 564, 662	1, 514, 621, 000	2. 68	9, 331	885	21, 453, 579	1, 882, 306
1924	483, 686, 538	1, 062, 626, 000	2. 20	7, 586	792	17, 100, 347	417, 226
1925	520, 052, 741	1, 060, 402, 000	2. 04	7, 144	748	17, 461, 560	601, 737
1926	573, 366, 985	1, 183, 412, 000	2. 06	7, 177	747	35, 271, 937	485, 666
1927	517, 763, 352	1, 029. 657, 000	1. 99	7, 011	759	18, 011, 744	549. 843
1928	500, 744, 970	933, 774, 000	1. 86	6, 450	691	16. 164, 485	546, 526
1929	534. 988, 593	952, 781, 000	1. 78	6, 057	679	17, 429, 298	495, 219
1930	467, 526, 299	795, 483, 000	1. 70	5, 891	700	15, 877, 407	240, 886
1931	382, 089, 396	588, 895, 000	1. 54	5, 642	669	12, 126, 299	206, 303
1932	309, 709, 872	406, 677, 000	1. 31	5, 427	594	8, 814, 047	186, 909
1933	333, 630, 533	445, 788, 000	1. 34	5, 555	559	9, 036, 947	197, 429
1934	359, 368, 022	628, 383, 000	1. 75	6, 258	565	10, 868, 552	179, 661
1935	372, 373. 122	658, 063, 000	1. 77	6, 315	582	9, 742, 430	201, 871
1936	439. 087, 903	770, 955, 000	1. 76	6, 875	618	10, 654, 959	271, 798
1937	445. 531, 449	864, 042, 000	1. 94	6, 548	646	13, 144. 678	257. 996
1938	348, 544, 764	678, 653. 000	1. 95	5, 777	602	10, 490, 269	241, 305
1939	394, 855, 325	728, 348, 366	1. 84	5, 820	621	11, 590, 478	355, 115
1940	460, 771, 500	879, 327, 227	1. 91	6, 324	639	16, 465, 928	371, 571
1941	514, 149, 245	1, 125, 362, 836	2. 19	6, 822	666	20. 740, 471	390, 049
1942	582. 692, 937	1, 373, 990. 608	2. 36	6, 972	663	22, 943. 305	498, 103
1943	590, 177, 069	1, 584, 644, 477	2. 69	6, 620	626	25, 836, 208	757, 634
1944	619, 576, 240	1, 810, 900, 542	2. 92	6, 928	624	26, 032, 348	633, 689
1945	577, 617, 327	1, 768, 204, 320	3. 06	7, 033	620	27, 956, 192	467, 473
1946	533, 922, 068	1, 835, 539. 476	3. 44	7, 333	699	41, 197, 378	434, 680
1947	630, 623, 722	2, 622, 634, 946	4. 16	8, 700	755	68, 666, 963	290, 141
1948	599, 518, 229	2, 993, 267, 021	4. 99	9, 079	774	45, 930, 133	291, 337
1949	437, 868, 036	2, 136, 870, 571	4. 88	8, 559	781	27, 842, 056	314, 980
1950	516, 311, 053	2, 500, 373, 779	4. 84	9, 429	790	25, 468, 403	346, 706
1951	533, 664, 732	2, 626, 030. 137	4. 92	8, 009	736	56, 721, 547	292, 378
1952	466, 840, 782	2, 289, 180, 401	4. 90	7, 275	703	47, 643, 150	262, 268
1953	457, 290, 449	2, 247, 828, 694	4. 92	6, 671	670	33, 760, 263	226, 900
1954	391, 706, 300	1, 769, 619, 723	4. 52	6, 130	603	31, 040, 564	198, 799

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[1] Figures for 1890 to 1914, inclusive, represent fiscal year ended June 30.

[2] Data not available.

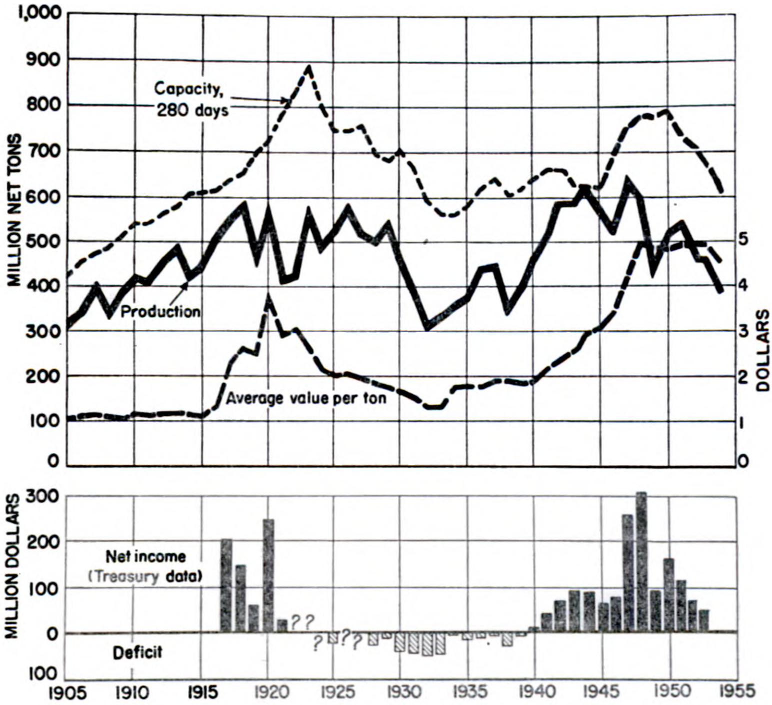

FIGURE 3.—Trends of bituminous-coal and lignite production, realization, mine capacity, and net income or deficit in the United States, 1905–54.

mines producing over 1,000 tons a year. The preliminary estimate of production for 1954 was 392 million tons, and the final figure based on the canvass was 391.7 million tons—a difference of only 0.1 percent. The preliminary estimates are later revised to agree with the final total production based on the canvass. Thus, the monthly and weekly estimates of production, summarized in tables 6–9, represent final figures and vary slightly from the preliminary figures of production published currently in the Weekly Coal Report.

Monthly and weekly production of bituminous coal and lignite varies much more than annual production. The major cause of current fluctuations in production is strikes. During periods of major strikes, approximately 80 percent of production is stopped. Even during periods of apparent labor peace, many strikes occur each year. According to the Bureau of Labor Statistics, for the past 10 years there was a low of 208 strikes in 1954 and a high of 598 strikes in 1945 in bituminous-coal and lignite mines.

In recent years the miners' vacation period has been marked by a sharp decline in production, as all miners under contract take their vacation during the latter part of June and the first few days in July. Other minor causes of current fluctuations in production included heavy snowstorms, which make it difficult for the miners to report for work.

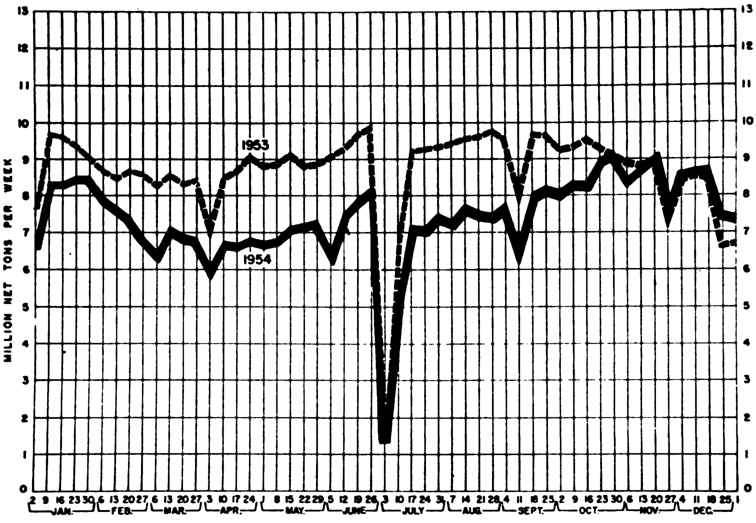

FIGURE 4.—Production of bituminous coal and lignite in the United States, 1953–54, by weeks.

TABLE 6.—Production of bituminous coal and lignite in the United States, 1953–54, with estimates by months

Month	Production (thousand net tons)		Maximum number of working days		Average production per working day (thousand net tons)	
	1953	1954	1953	1954	1953	1954
January	39, 954	34, 345	26	25	1, 537	1, 374
February	34, 711	29, 972	24	24	1, 446	1, 249
March	36, 899	31, 785	26	27	1, 419	1, 177
April	37, 484	28, 528	25. 3	25. 3	1, 482	1, 128
May	37, 716	29, 206	25. 5	25. 4	1, 479	1, 150
June	39, 019	30, 671	24. 1	23. 3	1, 619	1, 316
July	35, 307	27, 706	22. 7	23. 4	1, 555	1, 184
August	40, 651	33, 439	26	26	1, 564	1, 286
September	41, 379	34, 402	25	25	1, 655	1, 376
October	40, 949	36, 553	27	26	1, 517	1, 406
November	35, 798	37, 061	23. 7	24. 8	1, 511	1, 494
December	37, 423	38, 038	25. 3	25. 4	1, 479	1, 498
Total	457, 290	391, 706	300. 6	300. 6	1, 521	1, 303

SUMMARY BY STATES

Over a period of years there have been wide variations in production in different States. Table 10 lists production by States during the past 10 years and the year of maximum production for each State. As a background for comparison, the total production in the United States reached its peak in 1947. Georgia (a small producer) reached its peak output in 1903. Maryland (one of the oldest coal-producing States), Arkansas, and Michigan all reached their maximum production in 1907. It is most significant that nine States (including Illinois and Pennsylvania) reached their peak during World War I—1917–18. In striking contrast, Kentucky and West Virginia attained their maximum output in 1947. However, West Virginia ranked first in terms of production in 1954, followed by Pennsylvania,

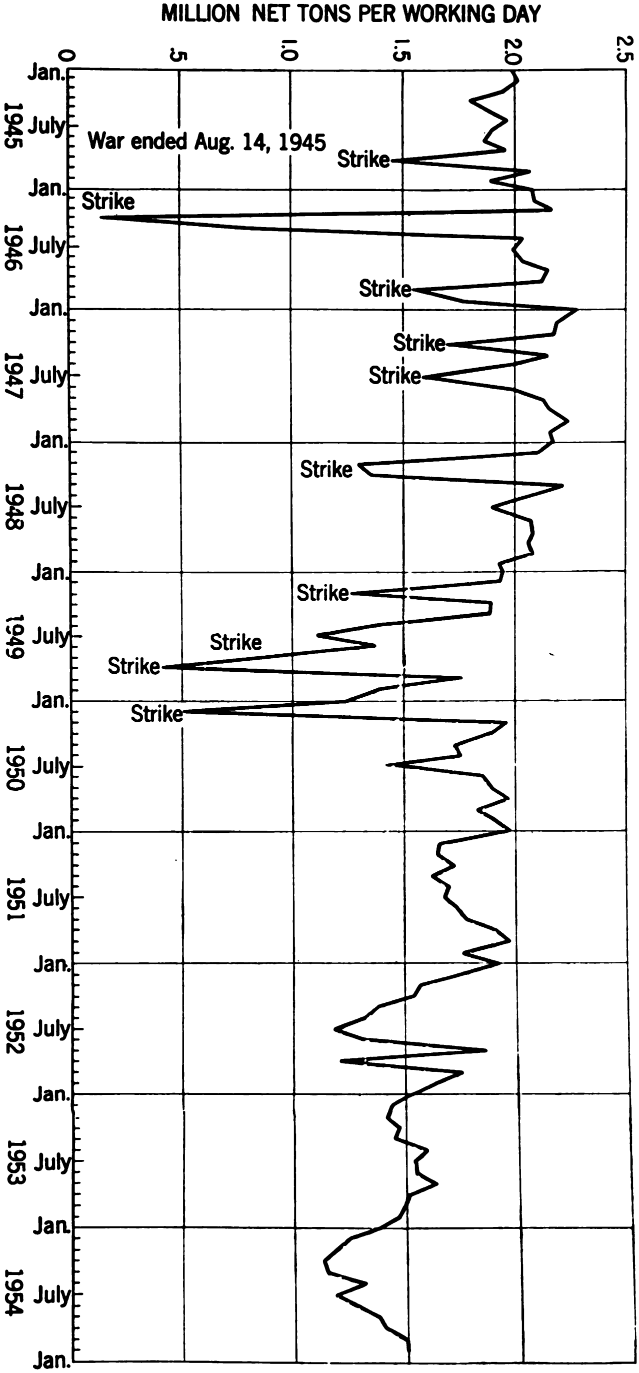

FIGURE 5.—Average production of bituminous coal and lignite in the United States per working day in each month, 1945–54.

TABLE 7.—Production of bituminous coal and lignite in the United States in 1954, by States, with estimates by months, in thousand net tons

[Totals for year are based on final complete returns from all operators known to have produced 1,000 tons and over per year. In most instances monthly apportionment is based on current records of railroad carloadings and river shipments, supplemented by direct reports from local sources]

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
Alabama	918	895	1,024	804	757	726	698	845	830	913	901	971	10,282
Alaska	78	79	77	51	32	25	42	45	52	41	66	79	667
Arizona	1	1	1	1	1	----	1	1	1	1	1	1	11
Arkansas	60	37	30	17	21	29	27	33	52	59	60	52	477
California (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	343	223	200	133	112	150	171	239	258	342	342	387	2,900
Georgia	1	1	1	----	----	----	----	1	1	1	1	1	8
Illinois	4,262	3,278	3,720	2,817	2,872	2,902	2,608	3,207	3,592	3,977	4,209	4,527	41,971
Indiana	1,489	1,307	1,344	975	855	858	768	876	932	1,094	1,341	1,561	13,400
Iowa	159	116	107	56	72	72	66	76	77	83	143	170	1,197
Kansas	148	119	117	86	71	84	89	109	125	142	135	147	1,372
Kentucky:													
Eastern	2,890	2,387	2,364	2,390	2,630	2,706	2,466	3,063	3,285	3,543	3,454	3,336	34,514
Western	1,825	1,392	1,605	1,530	1,530	1,919	1,770	2,010	2,157	2,312	2,265	2,135	22,450
Total Kentucky	4,715	3,779	3,969	3,920	4,160	4,625	4,236	5,073	5,442	5,855	5,719	5,471	56,964
Maryland	53	60	40	28	31	25	19	11	27	34	35	59	422
Missouri	275	211	242	162	133	133	169	203	218	241	244	283	2,514
Montana (bituminous)	110	129	127	91	116	130	100	144	128	135	148	133	1,491
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	15	13	7	7	6	8	11	11	11	11	12	11	123
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	2,369	2,394	2,521	2,620	2,744	2,816	2,660	3,040	3,005	3,055	2,766	2,479	32,469
Oklahoma	192	146	153	101	90	114	129	173	194	211	209	203	1,915
Pennsylvania	6,913	6,201	6,335	5,538	5,341	5,557	4,574	5,991	5,923	6,078	6,522	7,037	72,010
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	534	529	526	460	496	506	495	553	590	591	572	577	6,429
Texas (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Utah	422	358	361	301	341	423	277	436	504	489	504	592	5,008
Virginia	1,187	1,073	1,251	1,082	1,227	1,381	1,367	1,524	1,486	1,614	1,582	1,613	16,387
Washington	47	46	46	49	54	50	41	52	54	57	63	60	619
West Virginia:													
Southern [2]	6,228	5,586	5,913	5,778	6,313	6,503	5,959	6,945	7,010	7,601	7,441	7,684	78,961
Northern [3]	3,016	2,845	3,080	3,011	2,953	3,152	2,851	3,321	3,216	3,138	3,259	3,193	37,035
Total West Virginia	9,244	8,431	8,993	8,789	9,266	9,655	8,810	10,266	10,226	10,739	10,700	10,877	115,996
Wyoming	350	215	238	157	133	133	101	221	288	359	333	303	2,831
Lignite [4]	460	331	355	283	275	269	247	309	386	431	453	444	4,243
Total	34,345	29,972	31,785	28,528	29,206	30,671	27,706	33,439	34,402	36,553	37,061	38,038	391,706

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes operations on the N. & W., C. & O., Virginian, T. & O. C., B. C. & C., and the B. & O. in Kanawha, Mason, and Clay Counties.
[3] Rest of State, including the Panhandle district and Grant, Mineral, and Tucker Counties.
[4] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

TABLE 8.—Production of bituminous coal and lignite in the United States in 1954, by districts, with estimates by months, in thousand net tons

[Districts as defined in the Bituminous Coal Act of April 26, 1937 (50 Stats. 72, 91-94), and modifications thereto]

(Totals for year are based on final complete returns from all operators known to have produced 1,000 tons and over per year. In most instances monthly apportionment is based on current records of railroad carloadings and river shipments, supplemented by direct reports from local sources)

District	January	February	March	April	May	June	July	August	September	October	November	December	Total
1. Eastern Pennsylvania	2,789	2,545	2,621	2,336	2,227	2,272	2,146	2,305	2,355	2,571	2,676	2,879	29,722
2. Western Pennsylvania	4,196	3,734	3,773	3,249	3,164	3,331	2,466	3,719	3,616	3,562	3,903	4,239	42,952
3. Northern West Virginia	2,784	2,626	2,844	2,780	2,726	2,909	2,631	3,063	2,968	2,896	3,006	2,946	34,179
4. Ohio	2,369	2,394	2,521	2,620	2,744	2,816	2,660	3,040	3,005	3,055	2,766	2,479	32,469
5. Michigan	---	---	---	---	---	---	---	---	---	---	---	---	---
6. Panhandle	213	201	217	212	208	222	201	236	227	221	231	225	2,614
7. Southern Numbered 1	2,973	2,682	2,943	2,807	3,088	3,208	2,969	3,383	3,399	3,683	3,607	3,716	38,458
8. Southern Numbered 2	7,637	6,666	6,885	6,706	7,365	7,671	7,106	8,465	8,719	9,412	9,197	9,247	95,076
9. West Kentucky	1,825	1,392	1,605	1,530	1,530	1,919	1,770	2,010	2,157	2,312	2,265	2,135	22,450
10. Illinois	4,262	3,278	3,720	2,817	2,872	2,902	2,608	3,207	3,592	3,977	4,209	4,527	41,971
11. Indiana	1,489	1,307	1,344	975	855	858	768	876	932	1,094	1,341	1,561	13,400
12. Iowa	159	116	107	56	72	72	66	76	77	83	143	170	1,197
13. Southeastern	1,148	1,123	1,251	1,001	970	943	910	1,083	1,084	1,168	1,147	1,219	13,047
14. Arkansas-Oklahoma	142	99	95	60	59	78	82	107	135	149	150	139	1,295
15. Southwestern	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
16. Northern Colorado	108	53	76	45	30	21	14	19	53	96	95	128	738
17. Southern Colorado	213	176	128	92	85	134	163	226	211	252	254	265	2,229
18. New Mexico	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
19. Wyoming	350	215	238	157	133	133	101	221	288	359	333	303	2,831
20. Utah	422	358	361	301	341	423	277	436	504	489	504	592	5,008
21. North-South Dakota	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
22. Montana	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
23. Washington	125	125	123	100	86	75	83	97	106	98	129	139	1,286
Other districts [2]	1,111	882	933	684	651	684	685	870	974	1,076	1,105	1,129	10,784
Total	34,345	29,972	31,785	28,528	29,206	30,671	27,706	33,439	34,402	36,553	37,061	38,038	391,706

[1] Included in "Other districts"; not published to avoid disclosure of individual operations.

[2] Includes districts 15, 18, 21, and 22.

Kentucky, and Illinois, in that order. The total production from the earliest record to the end of 1954, by States, is given in the last column of table 10. Here, Pennsylvania ranks first, followed by West Virginia, Illinois, and Kentucky.

Detailed statistics, by States and by Coal Act districts, are summarized in tables 11 and 12. These tables make possible easy com-

TABLE 9.—Production of bituminous coal and lignite in the United States, 1953-54, with estimates by weeks

1953				1954			
Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)	Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)
Jan. 3	[1] 2,041	[1] 2	[2] 1,547	Jan. 2	[1] 483	[1] 1	[2] 1,358
Jan. 10	9,764	6	1,627	Jan. 9	8,359	6	1,393
Jan. 17	9,733	6	1,622	Jan. 16	8,357	6	1,393
Jan. 24	9,372	6	1,562	Jan. 23	8,573	6	1,429
Jan. 31	9,044	6	1,507	Jan. 30	8,573	6	1,429
Feb. 7	8,764	6	1,461	Feb. 6	7,977	6	1,330
Feb. 14	8,527	6	1,421	Feb. 13	7,721	6	1,287
Feb. 21	8,732	6	1,455	Feb. 20	7,375	6	1,229
Feb. 28	8,688	6	1,448	Feb. 27	6,899	6	1,150
Mar. 7	8,292	6	1,382	Mar. 6	6,450	6	1,075
Mar. 14	8,654	6	1,442	Mar. 13	7,112	6	1,185
Mar. 21	8,315	6	1,386	Mar. 20	6,922	6	1,154
Mar. 28	8,440	6	1,407	Mar. 27	6,837	6	1,140
Apr. 4	7,198	5.3	1,358	Apr. 3	6,048	5.3	1.141
Apr. 11	8,567	6	1,428	Apr. 10	6,782	6	1,130
Apr. 18	8,782	6	1,464	Apr. 17	6,749	6	1,125
Apr. 25	9,105	6	1,518	Apr. 24	6,856	6	1,143
May 2	8,854	6	1,476	May 1	6,773	6	1,129
May 9	8,917	6	1,486	May 8	6,834	6	1,139
May 16	9,196	6	1,533	May 15	7,154	6	1,192
May 23	8,856	6	1,476	May 22	7,202	6	1,200
May 30	8,923	5.5	1,622	May 29	7,274	6	1,212
June 6	9,105	6	1,518	June 5	6,452	5.4	1,195
June 13	9,322	6	1,554	June 12	7,561	6	1,260
June 20	9,794	6	1,632	June 19	7,950	6	1,325
June 27	9,972	5.6	1,781	June 26	8,287	5.7	1.454
July 4	1,647	1	1,647	July 3	1,492	1	1,492
July 11	6,989	5.2	1,344	July 10	5,355	5	1,071
July 18	9,246	6	1,541	July 17	7,199	6	1,200
July 25	9,262	6	1,544	July 24	7,099	6	1,183
Aug. 1	9,353	6	1,559	July 31	7,508	6	1,251
Aug. 8	9,449	6	1,575	Aug. 7	7,491	6	1,249
Aug. 15	9,620	6	1,603	Aug. 14	7,858	6	1,310
Aug. 22	9,661	6	1,610	Aug. 21	7,638	6	1,273
Aug. 29	9,834	6	1,639	Aug. 28	7,502	6	1,250
Sept. 5	9,684	6	1,614	Sept. 4	7,808	6	1,301
Sept. 12	8,177	5	1,635	Sept. 11	6,743	5	1,349
Sept. 19	9,735	6	1,623	Sept. 18	8,039	6	1,340
Sept. 26	9,724	6	1,621	Sept. 25	8,249	6	1,375
Oct. 3	9,289	6	1,548	Oct. 2	8,090	6	1,348
Oct. 10	9,341	6	1,557	Oct. 9	8,396	6	1,399
Oct. 17	9,581	6	1,597	Oct. 16	8,393	6	1,399
Oct. 24	9,340	6	1,557	Oct. 23	9,005	6	1,501
Oct. 31	9,180	6	1,530	Oct. 30	9,182	6	1,530
Nov. 7	8,930	6	1,488	Nov. 6	8,584	6	1,431
Nov. 14	8,918	5.7	1,565	Nov. 13	8,831	5.8	1,523
Nov. 21	9,056	6	1,509	Nov. 20	9,044	6	1,507
Nov. 28	7,507	5	1,501	Nov. 27	7,416	5	1,483
Dec. 5	8,462	6	1,410	Dec. 4	8,563	6	1,427
Dec. 12	8,691	6	1,449	Dec. 11	8,844	6	1,474
Dec. 19	8,596	6	1,433	Dec. 18	8,880	6	1,480
Dec. 26	6,754	4.3	1,571	Dec. 25	7,533	4.4	1,712
Jan. 2	[1] 6,307	[1] 4	[2] 1,358	Jan. 1	[1] 7,404	[1] 5	[2] 1,486
Total	457,290	300.6	1,521	Total	391,706	300.6	1,303

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[1] Figures represent output and number of working days in that part of the week included in the calendar year shown. Total production for the week ended January 2, 1954, was 6,790,000 net tons, and for January 1, 1955, 7,430,000 net tons.

[2] Average daily output for the entire week and not for working days in the calendar year shown.

TABLE 10.—Bituminous coal and lignite produced in the United States, by States, 1945–54, with production of maximum year and cumulative production from earliest record to end of 1954, in thousand net tons

State	Maximum production		Production, by years										Total production from earliest record to end of 1954
	Year	Quantity	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	
Alabama	1926	21, 001	18, 236	16, 183	19, 048	18, 801	12, 934	14, 422	13, 597	11, 383	12, 532	10, 282	884, 494
Arkansas	1907	2, 670	1, 854	1, 631	1, 871	1, 662	962	1, 169	1, 107	873	775	477	95, 777
Colorado	1917	12. 483	7, 621	5, 914	6, 358	5, 631	4, 636	4, 259	4, 103	3, 623	3, 575	2, 900	489, 581
Illinois	1918	89, 291	73, 011	63, 469	67, 860	65, 342	47, 208	56, 291	54, 200	45, 790	46, 010	41, 971	3, 375, 545
Indiana	1918	30, 679	25, 183	21, 697	25, 449	23, 849	16, 550	19, 957	19, 451	16, 350	15, 812	13, 400	1, 070, 258
Iowa	1917	8, 966	2, 046	1, 788	1, 684	1, 670	1, 725	1, 891	1, 630	1, 381	1, 388	1, 197	345, 220
Kansas	1918	7, 562	3, 228	2, 493	2, 745	2, 538	2, 031	2, 125	1, 961	2, 029	1, 715	1, 372	275, 253
Kentucky	1947	84, 241	69, 593	66, 553	84, 241	82, 084	62, 583	78, 495	74, 972	66, 114	65, 060	56, 964	2, 297, 379
Maryland	1907	5, 533	1, 763	2, 003	2, 051	1, 661	668	648	589	588	530	422	262, 602
Missouri	1917	5, 671	3, 983	3, 733	4, 236	4, 023	3, 647	2, 963	3, 269	2, 955	2, 393	2, 514	271, 562
Montana	1944	4, 844	4, 467	3, 723	3, 178	2, 898	2, 766	2, 520	2, 345	2, 070	1, 873	1, 491	167, 562
New Mexico	1918	4, 023	1, 484	1, 280	1, 443	1, 364	1, 004	727	783	760	514	123	124, 347
North Dakota	1950	3, 261	2, 522	2, 555	2, 760	2, 961	2, 967	3, 261	3, 224	2, 984	2, 803	(1)	[2] 79, 912
Ohio	1920	45, 878	32, 737	32, 314	37, 548	38, 708	30, 961	37, 761	37, 949	36, 209	34, 737	32, 469	1, 876, 807
Oklahoma	1920	4, 849	2, 909	2, 647	3, 421	3, 462	3, 022	2, 679	2, 223	2, 193	2, 168	1, 915	169, 953
Pennsylvania	1918	178, 551	132, 965	125, 497	147, 079	134, 542	89, 215	105, 870	108, 164	89, 181	93, 331	72, 010	7, 834, 347
Tennessee	1942	8, 158	6, 271	5, 618	6, 258	6, 483	4, 172	5, 070	5, 401	5, 265	5, 467	6, 429	351, 944
Utah	1947	7, 429	6, 679	5, 994	7, 429	6, 813	6, 160	6, 670	6, 136	6, 140	6, 544	5, 008	228. 364
Virginia	1952	21, 579	17, 235	15, 527	20, 171	17, 999	14, 584	17, 667	21, 400	21, 579	19, 119	16, 387	650, 275
Washington	1918	4, 082	1, 357	991	1, 118	1, 220	899	874	857	844	690	619	146, 333
West Virginia	1947	176, 157	152, 035	144, 020	176, 157	168, 862	122, 610	144, 116	163, 310	141, 713	134, 105	115, 996	5, 660, 983
Wyoming	1945	9, 847	9, 847	7, 635	8, 051	6, 412	6, 001	6, 348	6, 430	6, 088	5, 245	2, 831	390, 403
Other States [3]			591	657	468	533	563	528	564	729	904	4, 929	180, 917
Total	1947	630, 624	577, 617	533, 922	630, 624	599, 518	437, 868	516, 311	533, 665	466, 841	457, 290	391, 706	27, 229, 818

[1] North Dakota included in "Other States" in 1954 to avoid disclosure of individual operations.
[2] Excludes production of North Dakota in 1954 to avoid disclosure of individual operations.
[3] Production, if any, in Alaska, Arizona, California, Georgia, Idaho, Michigan, North Carolina, Oregon, South Dakota, or Texas, included in "Other States."

TABLE 11.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States

(Exclusive of mines producing less than 1,000 tons)

State	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day
		Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
Alabama	188	8,191.484	1,066,652	1,024,370	10,282.506	$6.55	8,217	191	1,571.346	6.54
Alaska	13	652,059	10.531	4,028	666.618	9.66	365	234	85.326	7.81
Arizona	3	----------	10,925	----------	10.925	6.23	25	133	3.332	3.28
Arkansas	27	428,064	47,920	1,284	477,268	7.52	587	144	84,537	5.65
California (lignite)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Colorado	114	2,014.070	819,898	65,823	2,899,791	5.54	2,617	157	411,062	7.05
Georgia	4	----------	8,090	----------	8.090	5.00	16	98	1,560	5.19
Illinois	185	36,628,982	5,001.067	341,087	41,971.136	3.82	17,431	162	2,827,898	14.84
Indiana	98	10,991,835	1,881,480	526.873	13,400.188	3.65	5,130	171	878,706	15.25
Iowa	70	644,689	549,696	2,313	1,196,698	3.76	720	176	126,734	9.44
Kansas	28	1.149,348	217,160	5,786	1,372.294	4.08	550	172	94,381	14.54
Kentucky	1,048	52,549,658	4,226,517	188,233	56,964,408	4.16	33,323	180	6,001,653	9.49
Maryland	63	111,125	310,148	343	421.616	4.46	383	182	69,534	6.06
Missouri	51	2,106,654	404,325	2,614	2,513,593	3.99	907	185	167,371	15.02
Montana (bituminous)	23	1,406,441	79,289	5,116	1,490,846	2.79	438	147	64,373	23.16
Montana (lignite)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
New Mexico	20	77,726	43,351	2,022	123,099	5.91	185	157	28,965	4.25
North Dakota (lignite)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Ohio	505	21,862,642	9,429,213	1,176,873	32,468,728	3.62	11,228	203	2,273,959	14.28
Oklahoma	37	1,834,671	79.080	1,083	1,914.834	5.88	1,381	179	247,213	7.75
Pennsylvania	1,344	59,043,938	10,311,410	2,654,753	72,010.101	5.26	53,135	176	9,342,501	7.71
South Dakota (lignite)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Tennessee	361	4,579,862	1,817,977	30,992	6,428,831	3.96	4,507	179	807.046	7.97
Texas (lignite)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Utah	53	4,561,658	418.497	27,797	5,007.952	5.94	3,078	178	548.622	9.13
Virginia	555	14,295,027	1,949.529	142.736	16,387,292	4.45	12.182	179	2,178.428	7.52
Washington	16	476.879	129.944	12.386	619.209	7.23	725	175	126.963	4.88
West Virginia	1,241	110,386,776	3,997,235	1,612.030	115.996.041	4.67	68,011	192	13.089,354	8.86
Wyoming	28	2,596.987	122,591	111,852	2,831,430	4.08	1,691	126	213.595	13.26
Lignite [5]	55	2,239,839	1,756,850	246,117	4,242.806	2.43	565	207	116,680	36.36
Total	6,130	338,830,414	44,689,375	8,186,511	391,706,300	4.52	227,397	182	41,361,139	9.47

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad siding, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipple, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal f. o. b. mines. Includes a value for coal not sold but used by producer, such as mine fuel and coal coked, as estimated by producer at average prices that might have been received if such coal had been sold commercially.

[4] Included in lignite total; not published to avoid disclosure of individual operations.

[5] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

TABLE 12.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by districts

[Districts as defined in the Bituminous Coal Act of April 26, 1937 (50 Stats. 72, 91–94), and modifications thereto]

(Exclusive of mines producing less than 1,000 tons)

District	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day
		Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
1. Eastern Pennsylvania	980	24, 139, 788	4, 485, 680	1, 096, 746	29, 722, 214	$4. 76	23, 143	168	3, 890, 501	7. 64
2. Western Pennsylvania	453	35, 153, 143	6, 239, 889	1, 558, 485	42, 951, 517	5. 59	30, 730	181	5, 576, 845	7. 70
3. Northern West Virginia	457	32, 179, 141	1, 721, 223	278, 783	34, 179, 147	4. 17	16, 352	185	3, 029, 118	11. 28
4. Ohio	505	21, 862, 642	9, 429, 213	1, 176, 873	32, 468, 728	3. 62	11, 228	203	2, 273, 959	14. 28
5. Michigan	------	------	------	------	------	------	------	------	------	------
6. Panhandle	30	1, 628, 711	291, 733	693, 496	2, 613, 940	4. 23	1, 444	199	287, 952	9. 08
7. Southern Numbered 1	500	36, 656, 524	1, 244, 173	557, 712	38, 458, 409	5. 33	29, 562	190	5, 611, 713	6. 85
8. Southern Numbered 2	1, 846	88, 109, 359	6, 558, 005	408, 829	95, 076, 193	4. 60	61, 750	185	11, 422, 826	8. 32
9. West Kentucky	126	21, 353, 301	1, 064, 015	33, 106	22, 450, 452	3. 07	6, 697	195	1, 308, 899	17. 15
10. Illinois	185	36, 628, 982	5, 001, 067	341, 087	41, 971, 136	3. 82	17, 431	162	2, 827, 898	14. 84
11. Indiana	98	10, 991, 835	1, 881, 480	526, 873	13, 400, 188	3. 65	5, 130	171	878, 706	15. 25
12. Iowa	70	644, 689	549, 696	2, 313	1, 196, 698	3. 76	720	176	126, 734	9. 44
13. Southeastern	412	9, 937. 903	2, 082, 810	1, 026, 300	13, 047, 013	5. 95	10, 096	192	1, 933, 568	6. 75
14. Arkansas-Oklahoma	47	1, 210, 920	82, 510	1, 537	1, 294, 967	6. 76	1, 063	165	175, 360	7. 38
15. Southwestern	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
16. Northern Colorado	14	327, 175	380, 727	30, 589	738, 491	4. 25	473	173	81, 831	9. 02
17. Southern Colorado	108	1, 735, 294	456, 734	36, 506	2, 228, 534	5. 99	2, 217	154	340, 366	6. 55
18. New Mexico	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
19. Wyoming	28	2, 596, 987	122, 591	111, 852	2, 831, 430	4. 08	1, 691	126	213, 595	13. 26
20. Utah	53	4, 561, 658	418. 497	27, 797	5, 007, 952	5. 94	3, 078	178	548, 622	9. 13
21. North-South Dakota	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
22. Montana	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
23. Washington	29	1, 128. 938	140. 475	16, 414	1, 285. 827	8. 49	1, 090	195	212, 289	6. 06
Other districts [5]	189	7, 983, 424	2, 538, 827	261, 213	10, 783, 464	3. 40	3, 502	177	620, 357	17. 38
Total	6, 130	338, 830. 414	44, 689, 375	8, 186, 511	391, 706, 300	4. 52	227, 397	182	41, 361, 139	9. 47

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal f. o. b. mines. Includes a value for coal not sold but used by producer, such as mine fuel and coal coked, as estimated by producer at average prices that might have been received if such coal had been sold commercially.

[4] Included in "Other districts"; not published to avoid disclosure of individual operations.

[5] Includes districts 15, 18, 21, and 22.

parisons between States and districts for such strategic items as production, number of mines, disposition of coal, average value per ton, number of men working, days worked, and output per man per day. As fluctuation seems to be the key characteristic of the soft-coal industry, it is not surprising to find wide variations among the States in most strategic items mentioned. Most variations, generally speaking, are explained in terms of physical conditions, extent of mechanization, or market demand.

NUMBER AND SIZE OF MINES

The unit in the statistical record is the mine, and operating companies are requested to make a separate report for each mine because its location is definitely known and can be related to a specific district or county; its identity can be followed through successive changes of ownership; and it is the natural operating unit from the point of view of cost, mechanical equipment, mining practice, and output per man per day. Since some companies operate two or more mines, the number of mines is much greater than the number of operating companies.

Over a period of many years, bituminous-coal and lignite mines have been increasing in size. The tendency toward larger mines has been influenced by more extensive mechanization. In 1924, when less than 1 percent of the underground production was loaded mechanically, only 18 percent of the output came from mines having an annual output of 500,000 tons and over. Thirty-one years later—by 1954—84 percent of the underground production was loaded mechanically, and 44 percent of the total production came from mines having an annual output of 500,000 tons and over. Larger stripping shovels have also influenced the development of larger mines.

Although almost half of the production of bituminous coal and lignite comes from very large mines, there are many small mines. Table 13 classifies the mines by size of output in 1954. Figure 6 shows the percentage of the number of mines and the percentage of production in each size class. It is very significant that the small mines—those producing less than 10,000 tons per year—constituted 54 percent of the total number and only 3 percent of total output. On the other hand, the large mines—those producing over 500,000 tons per year—constituted only 3 percent of the total number and 44 percent of the total production.

TABLE 13.—Number and production of bituminous-coal and lignite mines in the United States, 1954, by size of output

[Exclusive of mines producing less than 1,000 tons]

Size of mine	Mines		Production	
	Number	Percent	Net tons	Percent
Class 1—500,000 tons and over	190	3.1	172,514.718	44.1
Class 2—200,000 to 500,000 tons	300	4.9	99,054,059	25.3
Class 3—100,000 to 200,000 tons	290	4.7	41,307,458	10.5
Class 4—50,000 to 100,000 tons	410	6.7	29,292,402	7.5
Class 5—10,000 to 50,000 tons	1,612	26.3	35,802,550	9.1
Class 6—less than 10,000 tons	3,328	54.3	13,735,113	3.5
Total	6,130	100.0	391,706,300	100.0

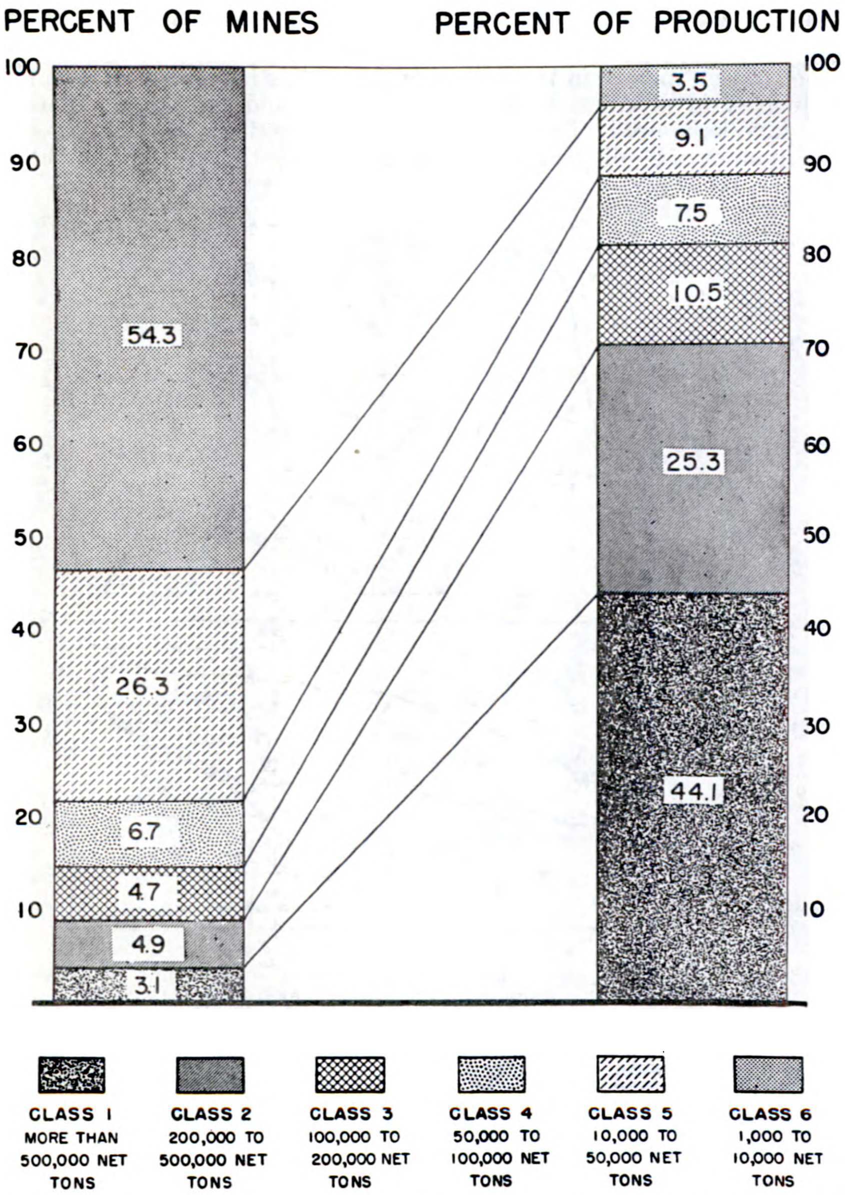

FIGURE 6.—Percentage of number of mines and of production of bituminous-coal and lignite mines in the United States, 1954, by size of output.

EMPLOYMENT AND PRODUCTIVITY

The bituminous-coal and lignite industry has become highly mechanized, mostly in the last 20 years. This has had a substantial influence on production per man per day and on the number of employees required. Roughly speaking, productivity has doubled and the number of employees has declined 50 percent in the past 20 years.

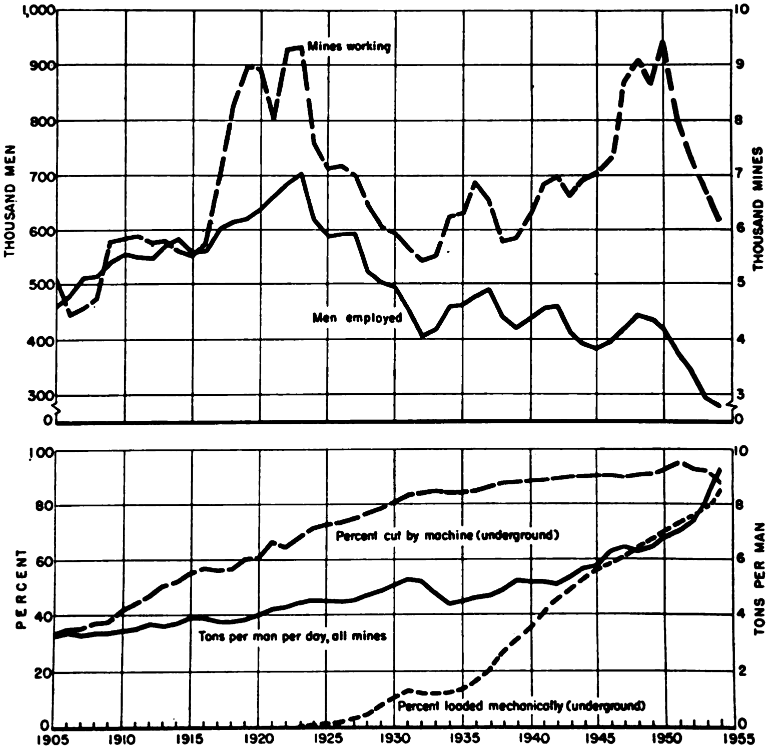

FIGURE 7.—Trends of employment, mechanization, and output per man at bituminous-coal and lignite mines in the United States, 1905–54.

UNDERGROUND MINING

Three-fourths of the bituminous coal and lignite produced is mined underground. The major tasks underground are cutting, drilling of shot holes, loading, and haulage. Loading is so important that it is given special treatment later in the section on Mechanical Loading. For many years, approximately 90 percent of the underground production has been cut by machine. The use of power drills for shot holes has increased rapidly in the past 15 years; and, by 1954, 80 percent of the production came from mines using power drills. Trolley locomotives are the principal method of underground haulage; however, in recent years the use of shuttle cars has been growing rapidly.

TABLE 14.—Growth of the bituminous-coal- and lignite-mining industry in the United States, 1890–1954

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons, per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [1]	Mechanically loaded	Mechanically cleaned [2]	Mined by stripping
1890	192,204	226	(3)	2.56	579	(3)	(3)	(3)	(3)
1891	205,803	223	(3)	2.57	573	5.3	(3)	(3)	(3)
1892	212,893	219	(3)	2.72	596	(3)	(3)	(3)	(3)
1893	230,365	204	(3)	2.73	557	(3)	(3)	(3)	(3)
1894	244,603	171	(3)	2.84	486	(3)	(3)	(3)	(3)
1895	239,962	194	(3)	2.90	563	(3)	(3)	(3)	(3)
1896	244,171	192	(3)	2.94	564	11.9	(3)	(3)	(3)
1897	247,817	196	(3)	3.04	596	15.3	(3)	(3)	(3)
1898	255,717	211	(3)	3.09	651	19.5	(3)	(3)	(3)
1899	271,027	234	46	3.05	713	22.7	(3)	(3)	(3)
1900	304,375	234	43	2.98	697	24.9	(3)	(3)	(3)
1901	340,235	225	35	2.94	664	25.6	(3)	(3)	(3)
1902	370,056	230	44	3.06	703	26.8	(3)	(3)	(3)
1903	415,777	225	28	3.02	680	27.6	(3)	(3)	(3)
1904	437,832	202	44	3.15	637	28.2	(3)	(3)	(3)
1905	460,629	211	23	3.24	684	32.8	(3)	(3)	(3)
1906	478,425	213	63	3.36	717	34.7	(3)	2.7	(3)
1907	513,258	234	14	3.29	769	35.1	(3)	2.9	(3)
1908	516,264	193	38	3.34	644	37.0	(3)	3.6	(3)
1909	543,152	209	29	3.34	699	37.5	(3)	3.8	(3)
1910	555,533	217	89	3.46	751	41.7	(3)	3.8	(3)
1911	549,775	211	27	3.50	738	43.9	(3)	(3)	(3)
1912	548,632	223	35	3.68	820	46.8	(3)	3.9	(3)
1913	571,882	232	36	3.61	837	50.7	(3)	4.6	(3)
1914	583,506	195	80	3.71	724	51.8	(3)	4.8	0.3
1915	557,456	203	61	3.91	794	55.3	(3)	4.7	.6
1916	561,102	230	26	3.90	896	56.9	(3)	4.6	.8
1917	603,143	243	17	3.77	915	56.1	(3)	4.6	1.0
1918	615,305	249	7	3.78	942	56.7	(3)	3.8	1.4
1919	621,998	195	37	3.84	749	60.0	(3)	3.6	1.2
1920	639,547	220	22	4.00	881	60.7	(3)	3.3	1.5
1921	663,754	149	23	4.20	627	66.4	(3)	3.4	1.2
1922	687,958	142	117	4.28	609	64.8	(3)	(3)	2.4
1923	704,793	179	20	4.47	801	68.3	0.3	3.8	2.1
1924	619,604	171	73	4.56	781	71.5	.7	(3)	2.8
1925	588,493	195	30	4.52	884	72.9	1.2	(3)	3.2
1926	593,647	215	24	4.50	966	73.8	1.9	(3)	3.0
1927	593,918	191	153	4.55	872	74.9	3.3	5.3	3.6
1928	522,150	203	83	4.73	959	76.9	4.5	5.7	4.0
1929	502,993	219	11	4.85	1,064	78.4	7.4	6.9	3.8
1930	493,202	187	43	5.06	948	81.0	10.5	8.3	4.3
1931	450,213	160	35	5.30	849	83.2	13.1	9.5	5.0
1932	406,380	146	120	5.22	762	84.1	12.3	9.8	6.3
1933	418,703	167	30	4.78	797	84.7	12.0	10.4	5.5
1934	458,011	178	15	4.40	785	84.1	12.2	11.1	5.8
1935	462,403	179	[4] 7	4.50	805	84.2	13.5	12.2	6.4
1936	477,204	199	21	4.62	920	84.8	16.3	13.9	6.4
1937	491,864	193	[4] 19	4.69	906	(3)	20.2	14.6	7.1
1938	441,333	162	13	4.89	790	87.5	26.7	18.2	8.7
1939	421,788	178	36	5.25	936	87.9	31.0	20.1	9.6
1940	439,075	202	8	5.19	1,049	88.4	35.4	22.2	9.2
1941	456,981	216	27	5.20	1,125	89.0	40.7	22.9	10.7
1942	461,991	246	7	5.12	1,261	89.7	45.2	24.4	11.5
1943	416,007	264	[4] 15	5.38	1,419	90.3	48.9	24.7	13.5
1944	393,347	278	[4] 5	5.67	1,575	90.5	52.9	25.6	16.3
1945	383,100	261	[4] 9	5.78	1,508	90.8	56.1	25.6	19.0
1946	[5] 396,434	214	[4] 23	6.30	1,347	90.8	58.4	26.0	21.1
1947	[5] 419,182	234	[4] 5	6.42	1,504	90.0	60.7	27.7	22.1
1948	[5] 441,631	217	[4] 16	6.26	1,358	90.7	64.3	30.2	23.3
1949	[5] 433,698	157	[4] 15	6.43	1,010	91.4	67.0	35.1	24.2
1950	[5] 415,582	183	[4] 56	6.77	1,239	91.8	69.4	38.5	23.9
1951	[5] 372,897	203	[4] 4	7.04	1,429	93.4	73.1	45.0	22.0
1952	[5] 335,217	186	[4] 6	7.47	1,389	92.8	75.6	48.7	23.3
1953	[5] 293,106	191	[4] 3	8.17	1,560	92.3	79.6	52.9	23.1
1954	[5] 227,397	182	[4] 4	9.47	1,724	88.8	84.0	59.4	25.1

[1] Percentages for 1890 to 1913, inclusive, are of total production, as a separation of strip and underground production is not available for those years.

[2] For 1906 to 1926, inclusive, these percentages are exclusive of coal cleaned at central washeries operated by consumers. [3] Data not available.

[4] Bureau of Labor Statistics, U. S. Department of Labor. [5] Average number of men working daily.

TABLE 15.—Average output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and by underground, auger, and strip mining

State	Mined underground			Mined by auger mining			Mined by stripping			Total production	
	Net tons	Percentage of total	Average tons per man per day	Net tons	Percentage of total	Average tons per man per day	Net tons	Percentage of total	Average tons per man per day	Net tons	Average tons per man per day
Alabama	8,740,049	85.0	5.99				1,542,457	15.0	13.60	10,282,506	6.54
Alaska	273,592	41.0	5.13				393,026	59.0	12.27	666,618	7.81
Arizona	10,925	100.0	3.28							10,925	3.28
Arkansas	253,362	53.1	3.89				223,906	46.9	11.57	477,268	5.65
California (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	2,602,393	89.7	6.55				297,398	10.3	21.56	2,899,791	7.05
Georgia	8,090	100.0	5.19							8,090	5.19
Illinois	25,516,650	60.8	11.89				16,454.486	39.2	24.14	41,971,136	14.84
Indiana	4,886,933	36.5	10.20				8,513,255	63.5	21.30	13,400,188	15.25
Iowa	337,719	28.2	4.88				858.979	71.8	14.94	1,196,698	9.44
Kansas	24,392	1.8	2.94				1,347,902	98.2	15.66	1,372,294	14.54
Kentucky	45,587,528	80.0	8.21	596,822	1.1	18.92	10,780,058	18.9	26.00	56,964.408	9.49
Maryland	228,181	54.1	4.47				193,435	45.9	10.44	421,616	6.06
Missouri	153,150	6.1	3.67				[2] 2,360,443	93.9	18.79	2,513,593	15.02
Montana (bituminous)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	10,936,121	33.7	8.89	953,206	2.9	31.34	20,579,401	63.4	20.30	32,468.728	14.28
Oklahoma	739,150	38.6	4.43				1,175,684	61.4	14.63	1,914,834	7.75
Pennsylvania	55,044,597	76.4	6.73	248,836	.4	18.07	16,716,668	23.2	14.53	72,010,101	7.71
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	4,902,993	76.3	6.82	36,618	.5	24.14	1,489,220	23.2	17.22	6,428,831	7.97
Texas (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Utah	5,007,952	100.0	9.13							5,007,952	9.13
Virginia	15,307,490	93.4	7.25	167,131	1.0	22.69	912,671	5.6	15.41	16,387,292	7.52
Washington	560,281	90.5	4.54				58,928	9.5	16.53	619,209	4.88
West Virginia	106,049,268	91.4	8.45	2,457,406	2.1	24.51	7,489,367	6.5	16.95	115.996,041	8.86
Wyoming	1,394.703	49.3	8.78				1,436,727	50.7	26.21	2,831,430	13.26
Lignite [3]	46,972	1.1	9.22				4,195.834	98.9	37.60	4,242.806	36.36
Other States [4]	499,540	30.9	6.56				1,114,405	69.1	64.96	1.613,945	17.29
Total	289,112,031	73.8	7.99	4,460,019	1.1	24.12	98,134,250	25.1	19.64	391,706,300	9.47

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Included in "Other States"; not published to avoid disclosure of individual operations.
[3] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.
[4] Includes Montana (bituminous) and New Mexico.

TABLE 16.—Underground production of bituminous coal and lignite in the United States, 1954, by States and mining methods

State	Cut by hand and shot from solid		Cut by machines				Mined by continuous mining machines		Total underground (net tons)
	Net tons	Percentage of total underground	Net tons	Percentage of total underground	Number of coal-cutting machines	Average output per machine (net tons)	Net tons	Percentage of total underground	
Alabama	600, 314	6. 9	7, 138, 987	81. 7	310	23, 029	1, 000, 748	11. 4	8, 740, 049
Alaska	263, 152	96. 2	1, 290	. 5	1	1, 290	9, 150	3. 3	273, 592
Arizona	4, 300	39. 4	6, 625	60. 6	1	6, 625	----	----	10, 925
Arkansas	6, 445	2. 5	246, 917	97. 5	50	4, 938	----	----	253, 362
Colorado	594, 056	22. 8	1, 947, 103	74. 8	278	7, 004	61, 234	2. 4	2, 602, 393
Georgia	8, 090	100. 0	----	----	----	----	----	----	8, 090
Illinois	78, 569	. 3	23, 491, 941	92. 1	318	73, 874	1, 946, 140	7. 6	25, 516, 650
Indiana	88, 701	1. 8	4, 502, 754	92. 1	111	40, 565	295, 478	6. 1	4, 886, 933
Iowa	161, 463	47. 8	176, 256	52. 2	31	5, 686	----	----	337, 719
Kansas	----	----	24, 392	100. 0	9	2, 710	----	----	24, 392
Kentucky	3, 386, 042	7. 4	41, 661, 454	91. 4	1, 394	29, 886	540, 032	1. 2	45, 587, 528
Maryland	96, 467	42. 3	131, 714	57. 7	24	5, 488	----	----	228, 181
Missouri	20, 360	13. 3	132, 790	86. 7	19	6, 989	----	----	153, 150
Montana (bituminous)	17, 676	4. 4	379, 765	95. 6	30	12, 659	----	----	397, 441
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	32, 840	32. 2	69, 259	67. 8	34	2, 037	----	----	102, 099
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	98, 611	. 9	9, 661, 904	88. 3	415	23, 282	1, 175, 606	10. 8	10, 936, 121
Oklahoma	7, 518	1. 0	731, 632	99. 0	106	6, 902	----	----	739, 150
Pennsylvania	1, 631, 485	2. 9	45, 502, 102	82. 7	2, 200	20. 683	7, 911, 010	14. 4	55, 044, 597
Tennessee	2, 115, 692	43. 2	2, 787, 301	56. 8	126	22, 121	----	----	4, 902, 993
Utah	31, 898	. 6	4, 692, 483	93. 7	153	30, 670	283, 571	5. 7	5, 007, 952
Virginia	2, 893, 585	18. 9	12, 102, 889	79. 1	475	25. 480	311, 016	2. 0	15, 307, 490
Washington	213, 550	38. 1	191, 226	34. 1	19	10, 065	155, 505	27. 8	560, 281
West Virginia	3, 567, 390	3. 4	99, 914, 881	94. 2	2, 893	34, 537	2, 566, 997	2. 4	106, 049, 268
Wyoming	6, 312	. 4	1, 309, 139	93. 9	219	5, 978	79, 252	5. 7	1, 394, 703
Lignite [2]	29, 912	63. 7	17, 060	36. 3	2	8, 530	----	----	46, 972
Total	15, 954, 428	5. 5	256, 821, 864	88. 8	9, 218	27, 861	16, 335, 739	5. 7	289, 112, 031

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes lignite in Montana and North Dakota.

TABLE 17.—Use of power drills for shot holes in underground bituminous-coal and lignite mines in the United States, 1940–54

(Production in thousand net tons)

Year	Number of mines using power drills	Number of power drills		Production in working places where shot holes are power drilled (net tons)			
		Electric	Compressed air	Electric drills	Compressed air drills	Total	Percentage of total underground
1940	1, 172	6, 613	1, 378	189, 534	7, 548	197, 082	47. 2
1941	1, 266	7, 697	1, 502	230, 841	6, 372	237, 213	51. 7
1942	1, 364	8, 482	1, 564	274, 380	6, 650	281, 530	54. 6
1943	1, 376	8, 930	1, 630	293, 599	6, 206	299, 805	58. 7
1944	1, 501	9, 755	1, 903	317, 049	7, 066	324, 115	62. 5
1945	1, 504	10, 267	1, 855	298, 867	3, 919	302, 786	64. 7
1946	1, 702	10, 968	1, 884	275, 835	2, 899	278, 734	66. 2
1947	2, 522	12, 940	1, 449	349, 113	2, 753	351, 866	71. 6
1948	2, 798	13, 970	1, 312	335, 001	1, 872	336, 873	73. 2
1949	2, 923	14, 087	1, 411	249, 941	1, 388	251, 329	75. 7
1950	3, 112	14, 277	1, 282	284, 904	1, 757	286, 661	73. 0
1951	3, 027	14, 231	1, 345	322, 345	2, 300	324, 645	78. 0
1952	2, 830	13, 468	1, 292	281, 549	2, 499	284, 048	79. 7
1953	2, 501	12, 054	1, 054	291, 297	1, 864	293, 161	83. 9
1954	2, 137	10, 782	885	231, 084	2, 473	233, 557	80. 7

TABLE 18.—Use of power drills for shot holes in underground bituminous-coal and lignite mines in the United States, 1954, by States

State	Number of mines using power drills	Number of power drills		Production in working places where shot holes are power drilled (net tons)			
		Electric	Compressed air	Electric drills	Compressed air drills	Total	Percentage of total underground
Alabama	66	472	22	6, 909, 115	----------	6, 909, 115	79. 1
Alaska	5	29	18	135, 786	122, 830	258, 616	94. 5
Arizona	1	1	----------	6, 625	----------	6, 625	60. 6
Arkansas	5	17	9	38, 174	----------	38, 174	15. 1
Colorado	64	272	40	1, 753, 945	----------	1, 753, 945	67. 4
Illinois	89	581	1	22, 715, 241	----------	22, 715, 241	89. 0
Indiana	35	168	4	4, 279, 419	----------	4, 279, 419	87. 6
Iowa	13	28	----------	126, 336	----------	126, 336	37. 4
Kansas	----------	----------	1	----------	1, 942	1, 942	8. 0
Kentucky	484	1, 670	70	37, 214, 020	182, 721	37, 396, 741	82. 0
Maryland	8	15	----------	55, 397	----------	55, 397	24. 3
Missouri	7	11	1	102, 032	----------	102, 032	66. 6
Montana (bituminous)	12	34	----------	374, 788	----------	374, 788	94. 3
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	2	2	----------	60, 229	----------	60, 229	59. 0
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	141	464	2	7, 955, 501	----------	7, 955, 501	72. 7
Oklahoma	7	94	1	467, 711	400	468, 111	63. 3
Pennsylvania	360	2, 073	354	39, 839, 686	247, 718	40, 087, 404	72. 8
Tennessee	55	227	17	2, 008, 173	520, 271	2, 528, 444	51. 6
Utah	43	139	----------	4, 113, 120	----------	4, 113, 120	82. 1
Virginia	252	737	41	11, 973, 566	22, 125	11, 995, 691	78. 4
Washington	8	30	143	104, 910	113, 332	218, 242	39. 0
West Virginia	453	3, 339	158	89, 502, 667	1, 262, 065	90, 764, 732	85. 6
Wyoming	16	364	3	1, 308, 768	----------	1, 308, 768	93. 8
Lignite [2]	11	15	----------	38, 679	----------	38, 679	82. 3
Total	2, 137	10, 782	885	231, 083, 888	2, 473, 404	233, 557, 292	80. 7

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes lignite in Montana and North Dakota.

TABLE 19.—Number of underground bituminous-coal and lignite mines and number of haulage units in use in the United States, in selected years [1]

Units	1924	1946	1948	1949	1950	1951	1952	1953	1954
Underground mines	7,352	5,888	7,108	6,798	7,559	6,225	5,632	5,034	4,653
Locomotives:									
Trolley	[2] 12,765	14,110	14,617	14,090	13,822	13,327	12,545	11,311	10,109
Battery	1,515	1,011	904	928	949	900	812	678	762
Other types	443	110	74	59	62	51	41	45	38
Total	14,723	15,231	15,595	15,077	14,833	14,278	13,398	12,034	10,909
Rope haulage units:									
Portable	(3)	4,084	3,886	3,904	4,225	3,875	3,584	2,838	1,926
Stationary	(3)	1,009	1,044	1,073	1,037	916	852	727	881
Total	649	5,093	4,930	4,977	5,262	4,791	4,436	3,565	2,807
Shuttle cars:									
Cable reel	(3)	(3)	(3)	2,144	2,782	3,191	3,382	3,797	4,400
Battery	(3)	(3)	(3)	623	512	567	462	425	431
Total	(3)	(3)	(3)	2,767	3,294	3,758	3,844	4,222	4,831
"Mother" conveyors	(3)	457	755	860	1,013	1,094	1,066	1,042	1,081
Animals	36,352	10,185	10,834	10,313	10,033	7,478	6,555	5,354	5,409

[1] Exclusive of lignite and Virginia semianthracite mines in 1946, 1948, and 1949.
[2] Includes combination trolley and battery locomotives.
[3] Data not available.

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TABLE 20.—Number of haulage units in use in underground bituminous-coal and lignite mines in the United States, 1953–54, by States

State	Locomotives						Shuttle cars				Rope-haulage units				"Mother" conveyor units		Animals	
	Trolley		Battery		Other types		Cable reel		Battery		Portable		Stationary					
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	401	365	5	6			134	206	15	10	17	25	19	19	26	27	276	189
Alaska		2	12	14						2		5	1					2
Arizona																	2	5
Arkansas	9	4	15	11			3				9	7	13	8	8	5	14	8
Colorado	104	117	71	67	1		37	32	23	26	40	20	64	57	4	5	190	171
Georgia																	5	4
Illinois	577	482	114	110	1		328	362	29	47	5	4	34	43	88	92	245	153
Indiana	184	176	4	2			85	107	34	25			10	4	1	3	48	57
Iowa	6	4	1	2	2								15	10			114	90
Kansas													1	1			9	10
Kentucky	1,521	1,298	29	25	4	3	588	742	52	60	117	100	69	105	170	189	1,526	1,066
Maryland	7	9	3	3				5				1	1	1			91	69
Missouri	1	1	3	4	1								5				38	24
Montana (bituminous)	48	27	1	1			6	3		5	2	3	8	8	1		5	11
Montana (lignite)		(1)		(1)		(1)		(1)	2	(1)		(1)	1	(1)		(1)	2	(1)
New Mexico	17	16	25	17									24	21			24	15
North Dakota (lignite)	8	(1)		(1)		(1)		(1)		(1)		(1)	1	(1)		(1)	21	(1)
Ohio	397	386	15	20		1	149	118			33	10	26	38	28	34	228	179
Oklahoma	15	11	7	9			4	5			1	5	7	3	6	24	11	10
Pennsylvania	3,024	2,662	155	166	12	6	812	848	96	81	2,146	1,368	209	242	159	197	1,139	944
Tennessee	132	131	2	7	1	4	35	33			4	3	12	9	13	13	432	432
Utah	191	173	21	24	1		127	157	16	15	4	5	33	34	18	13	29	24
Virginia	654	650	13	82	6	6	128	211	1	2	46	44	20	36	19	28	200	688
Washington	40	37	3	3							1	10	15	22			9	4
West Virginia	3,809	3,435	175	185	16	18	1,336	1,533	145	156	313	217	83	68	493	442	690	1,236
Wyoming	166	169	4	4			25	38	12		100	99	56	50	8	9	6	8
Lignite										[2] 2				[2] 2				[2] 10
Total	11,311	10,155	678	762	45	38	3,797	4,400	425	431	2,838	1,926	727	781	1,042	1,081	5,354	5,409

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[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes lignite in Montana and North Dakota.

TABLE 21.—Number and production of underground bituminous-coal and lignite mines using "mother" conveyors and number and length of units in use, in the United States, 1945–54 [1]

Year	Number of mines	Production (net tons)	Number of units in use	Average length (feet)	Total length (miles)
1945	117	40, 189, 857	359	1, 438	97. 6
1946	161	46, 022, 710	457	1, 484	128. 5
1947	199	70, 690, 920	594	1, 470	165. 3
1948	270	81, 821, 361	755	1, 460	208. 8
1949	314	69, 947, 713	860	1, 514	246. 7
1950	374	92, 413, 644	1, 013	1, 538	294. 9
1951	372	99, 643, 003	1, 094	1, 568	325. 0
1952	358	92, 168, 992	1, 066	1, 526	308. 2
1953	322	100, 155, 249	1, 042	1, 541	303. 9
1954	291	83, 211, 284	1, 081	1, 626	332. 9

[1] Includes all belt conveyors 500 ft. long and over used for underground transportation of coal, except main-slope conveyors. Excludes lignite and Virginia semianthracite mines in 1945–49.

TABLE 22.—Number and production of underground bituminous-coal and lignite mines using "mother" conveyors, and number and length of units in use in the United States, 1953–54, by States [1]

State	Number of mines		Production (net tons)		Number of units in use		Average length (feet)		Total length (miles)	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	5	6	1, 424, 043	1, 721, 459	26	27	1, 223	1, 470	6. 0	7. 5
Arkansas	2	2	93, 614	78, 336	8	5	1, 003	1, 160	1. 5	1. 1
Colorado	2	3	129, 483	114, 138	4	5	1, 775	2, 660	1. 3	2. 5
Illinois	24	20	15, 328, 960	12, 120, 982	88	92	1, 717	1, 904	28. 6	33. 2
Indiana	1	2	325, 526	607, 864	1	3	1, 000	1, 000	. 2	. 6
Kentucky	62	47	20, 676, 028	17, 922, 777	170	189	1, 768	1, 679	56. 9	60. 1
Montana (bituminous)	1	------	174, 276	------------	1	------	500	------	. 1	------
Ohio	9	10	1, 321, 804	2, 225, 444	28	34	1, 609	1, 612	8. 5	10. 4
Oklahoma	3	4	509, 582	685, 316	6	24	1, 458	1, 331	1. 7	6. 1
Pennsylvania	46	46	12, 540, 789	9, 559, 467	159	197	1, 535	1, 471	46. 2	54. 9
Tennessee	4	5	868, 251	1, 098, 886	13	13	1, 508	1, 269	3. 7	3. 1
Utah	5	6	1, 418, 737	975, 539	18	13	1, 050	1, 023	3. 6	2. 5
Virginia	9	14	2, 713, 860	3, 801, 426	19	28	2, 538	1, 566	9. 1	8. 3
West Virginia	144	121	39, 946, 737	31, 546, 567	493	442	1, 438	1, 679	134. 2	140. 4
Wyoming	5	5	2, 683, 559	753, 083	8	9	1, 550	1, 289	2. 3	2. 2
Total	322	291	100, 155, 249	83, 211, 284	1, 042	1, 081	1, 541	1, 626	303. 9	332. 9

[1] Includes all mines using belt conveyors, other than main-slope conveyors, 500 feet long and over for underground transportation of coal.

AUGER MINING

Augers are generally used in areas where strip mining has become economically impracticable because of thick overburden. They were first used about 1945, and separate statistics on coal-recovery augers begin with 1952.

Production at auger mines increased rapidly from less than 2 million tons in 1952 to over 4 million tons in 1954. (See table 25.) Auger mining was active in 6 States in 1954; and the sales, as reported by 4 manufacturers, indicate continued rapid growth of this type of mining. (See tables 23 and 24.) A few coal-recovery augers have been sold for underground use, but these units and the coal produced by them have been included with coal loaded mechanically underground.

TABLE 23.—Auger-mining operations in the bituminous-coal and lignite fields of the United States, 1954, by States

State	Number of auger mines	Equipment in use (number of units)			
		Augers	Power shovels	Power drills	Bulldozers
Kentucky	15	17	3	-----------	19
Ohio	32	32	2	2	22
Pennsylvania	21	25	-----------	1	13
Tennessee	3	5	-----------	-----------	4
Virginia	8	8	2	-----------	5
West Virginia	68	90	12	14	85
Total	147	177	19	17	148

State	Mined by augers (net tons)	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day
Kentucky	596, 822	192	164	31, 537	18. 92
Ohio	953, 206	186	164	30, 416	31. 34
Pennsylvania	248, 836	76	181	13, 773	18. 07
Tennessee	36, 618	18	84	1, 517	24. 14
Virginia	167, 131	65	113	7, 365	22. 69
West Virginia	2, 457, 406	583	172	100, 272	24. 51
Total	4, 460, 019	1, 120	165	184, 880	24. 12

TABLE 24.—Units of coal-recovery augers sold to bituminous-coal and lignite mines for surface use in the United States, as reported by manufacturers, 1945–52 and 1953–54, by States

State	1945–52[1]	1953	1954	State	1945–52[1]	1953	1954
Alabama	---------	--------	1	Tennessee	---------	2	--------
Kentucky	---------	5	10	Virginia	---------	2	1
Maryland	---------	1	---------	West Virginia	---------	26	21
Ohio	---------	11	12				
Pennsylvania	---------	8	9	Total	259	55	54

[1] Separate data by years and States not available.

STRIP MINING

In mining coal by stripping, the overburden above the coal seam is stripped off with large shovels or draglines, leaving the seam exposed. Then the coal is loaded (usually by smaller shovels) directly into trucks or railroad cars for haulage to tipples, railroad ramps, or the final destination. In 1954, coal was mined by stripping in every coal-producing State in the United States except Arizona, Georgia, and Utah.

Strip mines have two substantial advantages over underground mines: First, the output per man per day in strip mines more than doubles that in underground mines and second, the average value of strip coal, f. o. b. mines, is about one-third lower than that from underground mines. (See figs. 8 and 9 and table 25.)

The rapid growth of strip mining was made possible by development of larger and improved stripping and drilling equipment and trucks. The most notable recent changes in stripping equipment have been the almost complete disappearance of steam shovels and the increased number of diesel-powered shovels and draglines and large electric shovels and draglines.

In the past 7 years the average capacity of trucks used in strip mines has increased considerably, which reduced the number required. The average distance coal was hauled from strip mines to tipples or ramps has remained approximately 4 miles during the same period. (See tables 26–32.)

The average thickness of overburden at all bituminous-coal and lignite strip mines in the United States was 39 feet in 1950[5] and probably averaged nearly 45 feet in 1954. Several strip mines handled an average of more than 60 feet of overburden in 1954, and a few handled over 70 feet.

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[5] Young, W. H., and Anderson, R. L., Thickness of Bituminous-Coal and Lignite Seams at All Mines and Thickness of Overburden at Strip Mines in the United States in 1950: Bureau of Mines Inf. Circ. 7642, 1952, 18 pp.

TABLE 25.—Growth of strip mining at bituminous-coal and lignite mines in the United States, 1914–54, compared with underground and auger mining

Year	Production (thousand net tons)				Percentage of total mined by stripping	Average tons per man per day				Average value per ton f. o. b. mine				Number of strip mines	Number of power shovels and draglines
	Underground mines	Auger mines	Strip mines [1]	Total		Underground mines	Auger mines	Strip mines [1]	Total	Underground mines	Auger mines	Strip mines [1]	Total		
1914	421,423		1,281	422,704	0.3	3.71		5.06	3.71	(²)		(²)	$1.17	[3] 35	48
1915	439,792		2,832	442,624	.6	3.90		5.81	3.91	$1.13		$1.18	1.13	[3] 60	87
1916	498,587		3,933	502,520	.8	3.88		6.67	3.90	1.32		1.51	1.32	[3] 79	111
1917	546,001		5,790	551,791	1.0	3.75		6.52	3.77	2.26		2.34	2.26	[3] 126	182
1918	571,098		8,288	579,386	1.4	3.76		6.81	3.78	2.58		2.54	2.58	[3] 165	276
1919	460,225		5,635	465,860	1.2	3.82		6.21	3.84	2.49		2.33	2.49	[3] 168	287
1920	559,807		8,860	568,667	1.5	3.97		7.20	4.00	3.74		4.12	3.75	[3] 174	312
1921	410,865		5,057	415,922	1.2	4.18		8.28	4.20	2.89		2.87	2.89	[3] 155	279
1922	412,059		10,209	422,268	2.4	4.24		8.09	4.28	3.02		3.07	3.02	272	379
1923	552,625		11,940	564,565	2.1	4.43		9.32	4.47	2.69		2.31	2.68	263	442
1924	470,080		13,607	483,687	2.8	4.50		9.91	4.56	2.20		2.00	2.20	234	420
1925	503,182		16,871	520,053	3.2	4.45		11.18	4.52	2.05		1.84	2.04	227	389
1926	556,444		16,923	573,367	3.0	4.42		11.13	4.50	2.07		1.89	2.06	237	410
1927	499,385		18,378	517,763	3.6	4.47		11.06	4.55	1.99		1.90	1.99	255	455
1928	480,956		19,789	500,745	4.0	4.61		13.02	4.73	1.87		1.69	1.86	250	415
1929	514,721		20,268	534,989	3.8	4.73		14.08	4.85	1.79		1.57	1.78	200	411
1930	447,684		19,842	467,526	4.3	4.93		16.21	5.06	1.71		1.54	1.70	218	341
1931	363,157		18,932	382,089	5.0	5.12		17.68	5.30	1.54		1.51	1.54	235	314
1932	290,069		19,641	309,710	6.3	4.99		16.95	5.22	1.31		1.32	1.31	255	332
1933	315,360		18,270	333,630	5.5	4.60		13.59	4.78	1.34		1.33	1.34	289	389
1934	338,578		20,790	359,368	5.8	4.23		13.28	4.40	1.76		1.49	1.75	344	458
1935	348,726		23,647	372,373	6.4	4.32		12.01	4.50	1.79		1.47	1.77	368	507
1936	410,962		28,126	439,088	6.4	4.42		13.91	4.62	1.77		1.49	1.76	381	562
1937	413,780		31,751	445,531	7.1	(²)		(²)	4.69	(²)		(²)	1.94	449	(²)
1938	318,138		30,407	348,545	8.7	4.60		15.00	4.89	(²)		(²)	1.95	465	737
1939	357,133		37,722	394,855	9.6	4.92		14.68	5.25	1.88		1.49	1.84	537	914
1940	417,604		43,167	460,771	9.4	4.86		15.63	5.19	1.94		1.56	1.91	638	1,071
1941	459,078		55,071	514,149	10.7	4.83		15.59	5.20	2.23		1.79	2.19	769	1,321
1942	515,490		67,203	582,693	11.5	4.74		15.52	5.12	2.41		1.90	2.36	834	1,438
1943	510,492		79,685	590,177	13.5	4.89		15.15	5.38	2.75		2.28	2.69	1,004	1,839
1944	518,678		100,898	619,576	16.3	5.04		15.89	5.67	3.01		2.48	2.92	1,240	2,312

1945	467,630	----------	109,987	577,617	19.0	5.04	----------	15.46	5.78	3.16	----------	2.65	3.06	1,370	2,439
1946	420,958	----------	112,964	533,922	21.1	5.43	----------	15.73	6.30	3.59	----------	2.87	3.44	1,445	2,744
1947	491,229	----------	139,395	630,624	22.1	5.49	----------	15.93	6.42	4.35	----------	3.47	4.16	1,750	3,254
1948	460,012	----------	139,506	599,518	23.3	5.31	----------	15.28	6.26	5.26	----------	4.11	4.99	1,971	3,712
1949	331,823	----------	106,045	437,868	24.2	5.42	----------	15.33	6.43	5.18	----------	3.94	4.88	1,761	3,576
1950	392.844	----------	123,467	516,311	23.9	5.75	----------	15.66	6.77	5.15	----------	3.87	4.84	1,870	3,877
1951	416.047	----------	117,618	533,665	22.0	6.08	----------	16.02	7.04	5.21	----------	3.88	4.92	1,784	3,810
1952	356,425	1,506	108,910	466,841	23.3	6.37	20.07	16.77	7.47	5.24	4.31	3.81	4.90	1,643	3,527
1953	349,551	2,291	105,448	457,290	23.1	7.01	25.30	17.62	8.17	5.27	4.15	3.75	4.92	1,554	3,409
1954	289,112	4,460	98,134	391.706	25.1	7.99	24.12	19.64	9.47	4.87	3.41	3.52	4.52	1,329	3,390

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[1] Includes power strip pits proper and excludes horse stripping operations and mines combining stripping and underground in the same operation, 1914–42. The years 1943–54 include data on all strip mines.

[2] Data not available.

[3] Exclusive of horse-stripping operations.

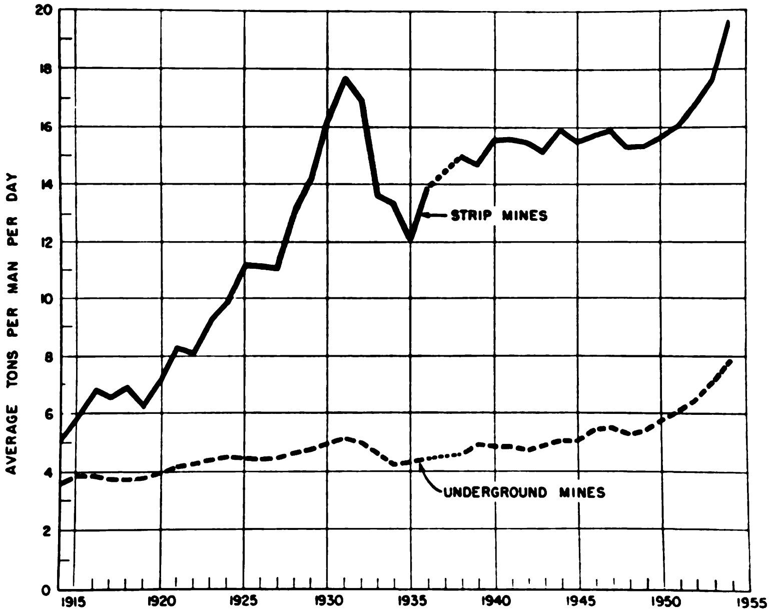

FIGURE 8.—Average tons per man per day at bituminous-coal and lignite mines in the United States, 1914–54, by strip mines and underground mines.

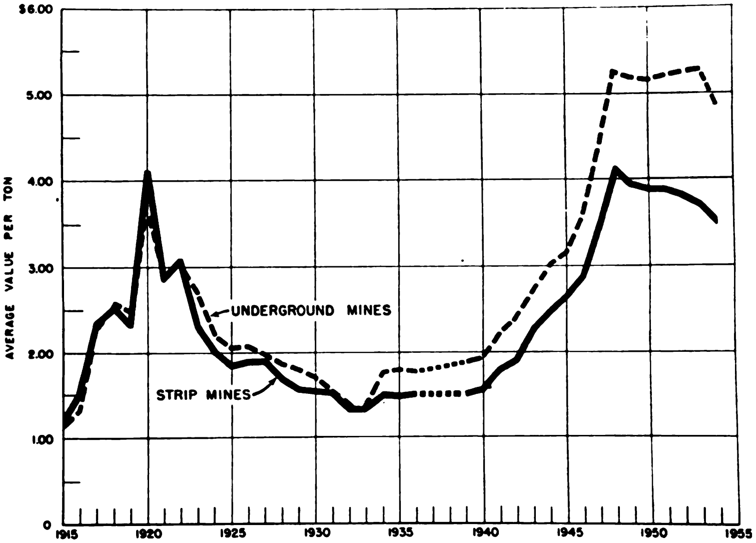

FIGURE 9.—Average value per ton, f. o. b. mines, of bituminous coal and lignite produced in the United States, 1915–54, by strip mines and underground mines.

TABLE 26.—Number and production of bituminous-coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1932–54

Year	Number of strip mines	Production (thousand net tons)	Number of power shovels and dragline excavators											Number of carryall scrapers	Number of bulldozers
			By type of power				By capacity (in cubic yards) of dipper or bucket				By type of machine		Total		
			Steam	Electric	Diesel	Gasoline	Less than 3	3–5, inclusive	6–12, inclusive	More than 12	Power shovels	Dragline excavators			
1932	255	19,641	166	105	[1] 61	(2)	(3)	(3)	(3)	(3)	(3)	(3)	332	(3)	(3)
1933	289	18,270	169	117	[1] 103	(2)	(3)	(3)	(3)	(3)	(3)	(3)	389	(3)	(3)
1934	344	20,790	188	121	[1] 149	(2)	(3)	(3)	(3)	(3)	(3)	(3)	458	(3)	(3)
1935	368	23,647	174	139	[1] 194	(2)	(3)	(3)	(3)	(3)	(3)	(3)	507	(3)	(3)
1936	381	28,126	188	151	[1] 223	(2)	(3)	(3)	(3)	(3)	(3)	(3)	562	(3)	(3)
1937	449	31,751	(3)	(3)	(3)	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
1938	465	30,407	142	155	[1] 440	(2)	(3)	(3)	(3)	(3)	(3)	(3)	737	(3)	(3)
1939	537	37,722	206	184	[1] 524	(2)	(3)	(3)	(3)	(3)	(3)	(3)	914	(3)	(3)
1940	638	43,167	180	194	[1] 697	(2)	(3)	(3)	(3)	(3)	(3)	(3)	1,071	(3)	(3)
1941	769	55,071	200	210	[1] 911	(2)	1,009	153	95	64	(3)	(3)	1,321	(3)	(3)
1942	834	67. 203	199	219	[1] 1,020	(2)	1,114	159	97	68	(3)	(3)	1. 438	(3)	(3)
1943	1,004	79,685	172	234	[1] 1,433	(2)	1,488	173	106	72	(3)	(3)	1. 839	(3)	(3)
1944	1,240	100,898	166	244	[1] 1,902	(2)	1,900	225	113	74	(3)	(3)	2,312	(3)	(3)
1945	1,370	109,987	141	256	[1] 2,042	(2)	2,004	243	117	75	(3)	(3)	2,439	(3)	(3)
1946	1,445	112,964	111	261	1,619	753	2,256	302	112	74	2,406	338	2,744	263	(3)
1947	1,750	139. 395	83	301	2,279	591	2,685	362	123	84	2,822	432	3,254	275	(3)
1948	1. 971	139,506	54	337	2,675	646	3,048	446	130	88	3,177	535	3,712	362	(3)
1949	1,761	106. 045	51	352	2,646	527	2,931	367	168	110	3,011	565	3,576	320	(3)
1950	1,870	123,467	42	348	2,880	607	3,182	416	170	109	3,247	630	3,877	286	(3)
1951	1. 784	117,618	26	346	2,905	533	3,088	420	187	115	3. 164	646	3,810	220	(3)
1952	1,643	108. 910	19	321	2. 642	545	2,800	425	183	119	2,892	635	3,527	218	(3)
1953	1,554	105,448	17	317	2,629	446	2,692	413	193	111	2,793	616	3,409	244	1,954
1954	1,329	98. 134	18	381	2,617	374	2,480	579	211	120	2,605	785	3,390	269	2,599

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[1] Includes gasoline shovels.
[2] Included with diesel shovels.
[3] Data not available.

TABLE 27.—Number and production of bituminous-coal and lignite strip mines, and units of stripping and loading equipment in use in the United States, 1954, by States

State	Number of strip mines	Production (net tons)	Number of power shovels and dragline excavators											Number of carry-all scrapers	Number of bull-dozers
			By type of power				By capacity (in cubic yards) of dipper or bucket				By type of machines		Total		
			Steam	Electric	Diesel	Gaso-line	Less than 3	3-5 in-clusive	6-12 in-clusive	More than 12	Power shovels	Drag-line exca-vators			
Alabama	32	1,542,457	1	5	80	2	65	16	5	2	64	24	88	19	71
Alaska	7	393,026	-------	-------	8	3	9	2	-------	-------	10	1	11	5	25
Arkansas	11	223,906	-------	1	13	5	12	4	2	1	10	9	19	-------	16
California (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	7	297,398	-------	2	5	-------	4	2	1	-------	5	2	7	4	11
Illinois	59	16,454,486	1	89	60	18	49	44	38	37	106	62	168	15	129
Indiana	51	8,513,255	-------	54	67	23	71	30	22	21	91	53	144	6	102
Iowa	31	858,979	-------	4	46	27	64	12	-------	1	41	36	77	4	40
Kansas	22	1,347,902	9	9	19	8	25	9	6	5	30	15	45	6	32
Kentucky:															
Eastern	31	1,173,190	-------	2	55	2	46	11	1	1	58	1	59	2	51
Western	31	9,606,868	-------	31	59	4	39	27	19	9	59	35	94	4	66
Total Kentucky	62	10,780,058	-------	33	114	6	85	38	20	10	117	36	153	6	117
Maryland	17	193,435	-------	-------	22	3	23	2	-------	-------	20	5	25	2	21
Missouri	30	2,360,443	5	23	14	8	25	12	5	8	39	11	50	4	35
Montana (bituminous)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	234	20,579,401	-------	65	469	79	432	128	34	19	493	120	613	54	461
Oklahoma	21	1,175,684	1	7	37	1	29	11	5	1	27	19	46	5	37
Pennsylvania	476	16,716,668	-------	38	1,133	141	1,068	191	49	4	986	326	1,312	56	954
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	51	1,489,220	-------	1	106	2	93	15	1	-------	94	15	109	2	78
Texas (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Virginia	19	912,671	-------	5	31	4	29	11	-------	-------	40	-------	40	4	45
Washington	4	58,928	-------	-------	5	3	8	-------	-------	-------	6	2	8	-------	7
West Virginia	139	7,489,367	-------	7	336	20	326	28	7	2	345	18	363	38	347
Wyoming	8	1,436,727	1	8	14	3	11	12	3	-------	19	7	26	8	12
Lignite [3]	44	4,195,834	-------	22	36	17	48	11	11	5	56	19	75	30	55
Other States [4]	4	1,114,405	-------	8	2	1	4	1	2	4	6	5	11	1	4
Total	1,329	98,134,250	18	381	2,617	374	2,480	579	211	120	2,605	785	3,390	269	2,599

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Included in "Other States"; not published to avoid disclosure of individual operations.
[3] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.
[4] Includes Montana (bituminous) and New Mexico.

TABLE 28.—Summary of operations at bituminous-coal and lignite strip mines using power drills in bank or overburden in the United States, 1946–54

Year	Number of mines	Production at mines using power drills		Number of power drills
		Quantity (net tons)	Percentage of total strip production	
1946	514	75, 375, 841	66. 7	764
1947	598	95, 915, 346	68. 8	875
1948	728	98, 809, 393	72. 3	1, 195
1949	756	78, 146, 655	73. 7	1, 256
1950	692	87, 205, 280	70. 6	1, 201
1951	650	85, 331, 204	72. 5	1, 125
1952	629	79, 252, 284	73. 0	1, 070
1953	603	80, 259, 365	76. 1	1, 048
1954	541	70, 107, 205	71. 4	983

TABLE 29.—Summary of operations at bituminous-coal and lignite strip mines using power drills in bank or overburden in the United States, 1953–54, by States

State	Number of mines		Production at mines using power drills				Number of power drills					
			Quantity (net tons)		Percentage of total strip production		Horizontal		Vertical		Total	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	20	18	1,146,989	848,205	71.0	55.0	25	32	11	7	36	39
Alaska	4	5	344,278	374,001	79.2	95.2	3	4	10	7	13	11
Arkansas	5	2	303,919	120,404	80.1	53.8	8	6	1	1	9	7
California (lignite)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)
Colorado	4	4	345,905	281,068	93.9	94.5	3	3	3	3	6	6
Illinois	34	33	15,057,274	13,094,891	90.3	79.6	42	40	21	26	63	66
Indiana	33	32	9,522,885	8,276,007	98.9	97.2	47	39	34	26	81	65
Iowa	27	22	899,398	673,145	92.3	78.4	26	20	20	21	46	41
Kansas	9	15	1,561,985	1,281,659	92.7	95.1	10	14	6	10	16	24
Kentucky:												
Eastern	13	16	1,264,740	916,780	63.0	78.1	9	13	12	14	21	27
Western	26	23	7,969,546	8,442,120	95.9	87.9	36	36	36	43	72	79
Total Kentucky	39	39	9,234,286	9,358,900	89.5	86.8	45	49	48	57	93	106
Maryland	---	2	---	25,029	---	12.9	---	2	---	2	---	4
Missouri	15	15	2,191,266	2,160,597	97.7	91.5	16	16	7	5	23	21
Montana (bituminous)	1	(2)	1,421,139	(2)	99.8	(2)	---	(2)	2	(2)	2	(2)
Montana (lignite)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)
New Mexico	1	(2)	9,000	(2)	53.8	(2)	---	(2)	2	(2)	2	(2)
North Dakota (lignite)	3	(1)	480,909	(1)	18.2	(1)	2	(1)	1	(1)	3	(1)
Ohio	122	94	17,925,551	15,965,442	82.9	77.6	119	101	66	56	185	157
Oklahoma	8	10	1,069,167	838,928	82.7	71.4	12	11	2	2	14	13
Pennsylvania	172	144	10,001,963	7,546,820	49.6	45.1	158	126	90	97	248	223
South Dakota (lignite)	2	(1)	23,671	(1)	100.0	(1)	1	(1)	1	(1)	2	(1)
Tennessee	6	13	173,116	621,137	25.6	41.7	5	12	2	4	7	16
Texas (lignite)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)	---	(1)
Virginia	6	11	704,629	832,067	54.1	91.2	6	10	5	7	11	17
Washington	1	1	89,573	16,266	100.0	27.6	---	---	5	3	5	3
West Virginia	86	70	6,421,314	4,974,615	64.6	66.4	105	91	67	49	172	140
Wyoming	5	(2)	1,331,148	(2)	78.1	(2)	6	(2)	5	(2)	11	(2)
Lignite [3]	---	5	---	503,964	---	12.0	---	10	---	2	---	12
Other States	---	[4] 6	---	[4] 2,314,060	---	[4] 90.7	---	[4] 6	---	[4] 6	---	[4] 12
Total	603	541	80,259,365	70,107,205	76.1	71.4	639	592	409	391	1,048	983

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Included in "Other States"; not published to avoid disclosure of individual operations.
[3] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.
[4] Includes Montana (bituminous), New Mexico, and Wyoming.

TABLE 30.—Summary of method of haulage from bituminous-coal and lignite strip mines to tipples or ramps in the United States, 1948–54 [1]

Year	Strip mines reporting method of haulage							Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Quantity (net tons)	Percentage of total strip production		
1948	97,450,399	7,214	9.4	3.7	6,327,989	103,778,388	74.4	35,727,532	139,505,920
1949	73,229,556	6,694	10.1	3.7	5,365,432	78,594,988	74.1	27,450,311	106,045,299
1950	88,666,733	6,564	10.3	3.8	4,364,333	93,031,066	75.3	30,435,498	123,466,564
1951	87,427,029	6,173	10.6	4.0	2,424,994	89,852,023	76.4	27,765,653	117,617,676
1952	88,589,637	5,799	11.3	4.0	2,296,744	90,886,381	83.5	18,023,375	108,909,756
1953	84,764,694	5,287	12.2	4.0	2,104,609	86,869,303	82.4	18,579,266	105,448,569
1954	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250

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[1] Excludes lignite in 1948 and 1949.

TABLE 31.—Summary of method of haulage from bituminous-coal and lignite strip mines to tipple or ramp, in the United States, 1954 by States

State	Strip mines reporting method of haulage							Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Quantity (net tons)	Percentage of total strip production		
Alabama	811,721	104	8.0	4.3		811,721	52.6	730,736	1,542,457
Alaska	280,901	22	13.3	3.2		280,901	71.5	112,125	393,026
Arkansas	190,529	22	8.8	3.4		190,529	85.1	33,377	223,906
Colorado	277,844	18	15.8	2.0		277,844	93.4	19,554	297,398
Illinois	14,823,473	288	27.7	3.0		14,823,473	90.1	1,631,013	16,454,486
Indiana	7,029,032	249	22.5	3.8		7,029,032	82.6	1,484,223	8,513,255
Iowa	703,423	49	8.8	2.5		703,423	81.9	155,556	858,979
Kansas	1,063,452	41	24.5	3.7	119,938	1,183,390	87.8	164,512	1,347,902
Kentucky	7,717,347	230	15.1	2.5		7,717,347	71.6	3,062,711	10,780,058
Maryland	68,239	25	11.0	6.1		68,239	35.3	125,196	193,435
Missouri	2,144,577	62	26.6	3.7		2,144,577	90.9	215,866	2,360,443
Montana (bituminous)					1,083,815	1,083,815	99.1	9,590	1,093,405
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico								21,000	21,000
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	16,549,549	805	12.7	4.6		16,549,549	80.4	4,029,852	20,579,401
Oklahoma	646,159	57	10.1	3.0		646,159	55.0	529,525	1,175,684
Pennsylvania	11,215,445	1,527	9.8	5.5		11,215,445	67.1	5,501,223	16,716,668
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Texas	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	389,734	72	9.6	9.0		389,734	26.2	1,099,486	1,489,220
Virginia	543,900	36	9.6	1.3		543,900	59.6	368,771	912,671
Washington	17,766	5	12.8	1.9		17,766	30.1	41,162	58,928
West Virginia	4,826,537	510	10.6	4.8		4,826,537	64.4	2,662,830	7,489,367
Wyoming	485,926	19	11.2	3.8		485,926	33.8	950,801	1,436,727
Lignite [2]	4,008,935	109	13.6	2.0		4,008,935	95.5	186,899	4,195,834
Total	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes lignite in Montana, North Dakota, South Dakota, and Texas.

TABLE 32.—Stripping operations in the bituminous-coal and lignite fields of the United States, 1954, by States

State	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day
Alabama	32	1, 542, 457	649	175	113, 357	13. 60
Alaska	7	392, 026	132	243	32, 033	12. 27
Arkansas	11	223, 906	105	184	19. 359	11. 57
California (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	7	297, 398	102	135	13, 794	21. 56
Illinois	59	16, 454, 486	3, 223	211	681, 636	24. 14
Indiana	51	8, 513, 255	2, 062	194	399, 764	21. 30
Iowa	31	858, 979	251	229	57, 505	14. 94
Kansas	22	1, 347, 902	480	179	86, 081	15. 66
Kentucky:						
Eastern	31	1, 173, 190	419	178	74, 467	15. 75
Western	31	9, 606, 868	1, 647	206	340, 084	28. 25
Total Kentucky	62	10, 780, 058	2, 066	201	414, 551	26. 00
Maryland	17	193, 435	101	183	18, 525	10. 44
Missouri	30	2, 360, 443	595	211	125, 635	18. 79
Montana (bituminous)	(2)	(2)	(2)	(2)	(2)	(2)
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	(2)	(2)	(2)	(2)	(2)	(2)
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	234	20, 579, 401	4, 446	228	1, 013, 953	20. 30
Oklahoma	21	1, 175, 684	428	188	80, 340	14. 63
Pennsylvania	476	16, 716, 668	5, 582	206	1, 150, 388	14. 53
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	51	1, 489, 220	451	192	86, 458	17. 22
Texas (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Virginia	19	912, 671	298	199	59, 242	15. 41
Washington	4	58, 928	25	143	3, 565	16. 53
West Virginia	1, 115	7, 489, 367	2, 228	198	441, 879	16. 95
Wyoming	8	1, 436, 727	246	223	54, 824	26. 21
Lignite [3]	44	4, 195, 834	536	208	111, 586	37. 60
Other States [4]	4	1, 114, 405	89	193	17, 156	64. 96
Total	2, 305	98, 134, 250	24, 095	207	4, 981, 631	19. 70

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Included in "Other States"; not published to avoid disclosure of individual operations.
[3] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.
[4] Includes Montana (bituminous) and New Mexico.

MECHANICAL LOADING

In the past 10 years the mechanical loading of underground bituminous coal and lignite has increased from 53 percent to 84 percent of the total output. Wage rates probably were the most important factor that caused this rapid rate of progress in mechanization; however, increased mechanization resulted in a 60-percent increase in productivity in 1954 over 1944. Although the overall mechanization showed a gradual increase during this period, the following changes occurred in the methods of loading: Mobile loading into mine cars decreased from 57 to 17 percent of the total mechanically loaded; mobile loading into shuttle cars increased from 14 to 62 percent; duckbills or other self-loading conveyors decreased from 8 to 2 percent; hand-loaded conveyors decreased from 17 to 6 percent; and continuous-mining machines started in 1948 and handled 7 percent of the total mechanically loaded output in 1954. (See tables 33 and 34.)

In tables 35 and 36 certain data on mechanical loading have been arranged into three groups: (1) Continuous-mining machines, devices that mine and load the coal; (2) loading machines (mobile loading

TABLE 33.—Growth of mechanical loading at underground bituminous-coal and lignite mines in the United States, 1923–54

(Production in thousand net tons)

Year	Underground production mechanically loaded									Percentage of underground production mechanically loaded	Number of mechanical loading units					
	Loaded by machines				Continuous mining machines	Handled by conveyors			Total mechanically loaded		Mobile loading machines	Scrapers	Conveyors equipped with duckbills or other self-loading heads	Continuous mining machines	Pit-car loaders	Hand-loaded conveyors
	Mobile loading machines	Scrapers	Conveyors equipped with duckbills or other self-loading heads	Total		Pit-car loaders	Hand-loaded conveyors	Total								
1923	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 1,880	[2] 0.3	(1)	(1)	(1)	----------	(1)	(1)
1924	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 3,496	[2] .7	(1)	(1)	(1)	----------	(1)	(1)
1925	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 6,243	[2] 1.2	(1)	(1)	(1)	----------	(1)	(1)
1926	7,786	1,554	682	10,022	----------	523	(1)	(1)	[2] 10,545	[2] 1.9	295	133	27	----------	(1)	(1)
1927	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	16,500	3.3	(1)	(1)	(1)	----------	(1)	(1)
1928	11,811	1,548	1,200	14,559	----------	4,117	2,883	7,000	21,559	4.5	397	130	82	----------	1,040	(1)
1929	16,432	1,550	1,309	19,291	----------	14,979	3,592	18,571	37,862	7.4	488	126	99	----------	2,521	(1)
1930	20,073	1,637	1,628	23,338	----------	19,116	4,528	23,644	46,982	10.5	545	150	140	----------	2,876	(1)
1931	19,407	1,471	1,811	22,689	----------	19,172	5,701	24,873	47,562	13.1	583	146	165	----------	3,428	(1)
1932	14,825	1,132	1,630	17,587	----------	12,590	5,640	18,230	35,817	12.3	548	128	159	----------	3,112	(1)
1933	17,865	991	1,656	20,512	----------	11,413	5,896	17,309	37,821	12.0	523	93	132	----------	2,453	525
1934	20,750	1,004	2,082	23,836	----------	11,089	6,508	17,597	41,433	12.2	534	119	157	----------	2,288	574
1935	24,675	1,118	2,595	28,388	----------	11,098	7,691	18,789	47,177	13.5	657	78	179	----------	2,098	670
1936	40,970	1,273	3,240	45,483	----------	10,538	10,956	21,494	66,977	16.3	980	106	234	----------	1,851	936
1937	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	83,500	20.2	(1)	(1)	(1)	----------	(1)	(1)
1938	57,824	1,031	4,248	63,103	----------	5,653	16,337	21,990	85,093	26.7	1,405	117	346	----------	1,392	1,526
1939	76,442	1,007	6,759	84,208	----------	5,038	21,466	26,504	110,712	31.0	1,573	131	559	----------	873	1,834
1940	100,962	1,255	10,362	112,579	----------	3,979	31,312	35,291	147,870	35.4	1,720	116	656	----------	697	2,263
1941	126,478	1,290	14,918	142,686	----------	3,447	40,534	43,981	186,667	40.7	1,985	109	788	----------	607	2,807
1942	160,301	1,405	20,683	182,389	----------	3,252	47,262	50,514	232,903	45.2	2,301	93	1,062	----------	481	3,041
1943	179,008	1,349	22,917	203,274	----------	2,669	43,862	46,531	249,805	48.9	2,525	83	1,226	----------	321	3,191
1944	202,875	1,341	23,164	227,380	----------	1,835	44,974	46,809	274,189	52.9	2,737	87	1,331	----------	241	3,236
1945	198,668	1,252	21,506	221,426	----------	986	40,100	41,086	262,512	56.1	2,950	87	1,383	----------	142	3,385
1946	186,975	917	19,678	207,570	----------	623	37,148	37,771	245,341	58.3	3,200	75	1,521	----------	93	3,470
1947	229,836	854	21,921	252,611	----------	353	45,193	45,546	298,157	60.7	3,569	67	1,531	----------	71	3,979
1948	[3] 232,667	743	19,634	253,044	(4)	184	42,578	42,762	295,806	64.3	[3] 3,980	56	1,632	(4)	37	4,125
1949	[3] 177,239	339	13,994	191,572	(4)	54	30,750	30,804	222,376	67.0	[3] 4,205	46	1,483	(4)	17	4,312
1950	[3] 222,976	318	13,985	237,279	(4)	39	35,407	35,446	272,725	69.4	[3] 4,318	39	1,329	(4)	12	4,434
1951	[5] 252,663	126	13,884	266,673	(4)	(6)	37,583	37,583	304,256	73.1	[5] 4,410	22	1,242	(4)	(6)	3,904
1952	218,982	77	10,590	229,649	8,215	(6)	31,130	31,130	268,994	75.5	4,083	19	1,049	152	(6)	3,569
1953	232,585	239	8,531	241,355	11,830	(6)	25,144	25,144	278,329	79.6	3,985	29	849	219	(6)	2,994
1954	206,546	411	4,672	211,629	16,336	(6)	15,005	15,005	242,970	84.0	4,314	48	633	325	(6)	2,162

[1] Data not available.
[2] Exclusive of tonnage "Handled by conveyors."
[3] Includes continuous-mining machines.
[4] Included with mobile loading machines.
[5] Includes continuous mining machines and augers.
[6] Canvass of pit-car loaders discontinued in 1951.

machines, scrapers and duckbills, or other self-loading conveyors), devices that eliminate hand shoveling; and (3) hand-loaded conveyors, devices that greatly reduce the labor in hand shoveling. Most of the 17 mines listed as using continuous mining machines only, also used mobile loading machines in conjunction with the continuous mining machines. In 1954, 90 mobile loading machines were reported as used in this manner. All tonnage mined by continuous-mining machines was credited to this category, even though it may have been mined and dumped on the floor and loaded out with a mobile loading machine. Even though continuous-mining machines have been in use since 1948 and were used in 110 mines in 1954, no definite pattern in loading the coal as mined by continuous mining machines into transportation units has yet been established.

Sales of mechanical loading equipment declined in 1954 from 1953 in all items except continuous-mining machines. Shuttle-car and "mother" conveyor sales also dropped in 1954 from 1953; however, face and bridge conveyor sales increased substantially. (See tables 38–40.)

TABLE 34.—Bituminous coal and lignite mechanically loaded underground in the United States, 1953–54, by type of loading equipment

Type of equipment	1953		1954	
	Net tons	Percentage of total	Net tons	Percentage of total
Mobile loading machines:				
Loading direct into mine cars	65, 910, 130	23. 7	41, 588, 639	17. 1
Loading onto conveyors	10, 532, 695	3. 8	11, 348, 416	4. 7
Loading into shuttle-cars	156, 142, 324	56. 1	153, 609, 047	63. 2
Continuous-mining machines	11, 830, 097	4. 3	16, 335, 739	6. 7
Scrapers	238, 839	. 1	411, 045	. 2
Conveyors equipped with duckbills or other self-loading heads	8, 530, 949	3. 0	4, 671, 672	1. 9
Hand-loaded conveyors	25, 143, 948	9. 0	15, 005, 091	6. 2
Total mechanically loaded	278, 328, 982	100. 0	242, 969, 649	100. 0

TABLE 35.—Comparative changes in underground mechanical loading of bituminous coal and lignite by principal types of loading devices in the United States, 1953–54, by States

State	Net tons by—						Total mechanically loaded (net tons)		Total production at mines using mechanical loading devices (net tons)		Handled by each class (percent)					
	Loading machines [1]		Continuous-mining machines		Hand-loaded conveyors						Loading machines [1]		Continuous-mining machines		Hand-loaded conveyors	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	7,605,058	6,007,199	679,625	1,000,748	1,169,280	824,659	9,453,963	7,832,606	9,657,765	7,949,839	80.4	76.7	7.2	12.8	12.4	10.5
Alaska	52,000	139,926	----------	9,150	15,000	----------	67,000	149,076	368,245	285,335	77.6	93.9	------	6.1	22.4	------
Arkansas	----------	----------	----------	----------	343,238	242,227	343,238	242,227	343,238	242,227	------	------	------	------	100.0	100.0
Colorado	2,072,488	1,721,209	110,391	61,284	117,955	147,542	2,300,834	1,929,985	2,738,844	2,252,521	90.1	89.2	4.8	3.2	5.1	7.6
Illinois	26,951,154	23,003,431	1,555,888	1,946,140	17,886	6,856	28,524,928	24,956,427	23,615,046	24,973,892	94.5	92.2	5.4	7.8	.1	------
Indiana	5,999,143	4,435,428	----------	295,478	----------	----------	5,999,143	4,730,906	6,000,043	4,736,138	100.0	93.8	------	6.2	------	------
Iowa	8,250	81,968	----------	----------	----------	----------	8,250	81,968	94,174	85,968	100.0	100.0	------	------	------	------
Kentucky	31,823,182	30,442,519	494,054	540,032	4,165,805	2,894,096	36,483,041	33,876,647	39,501,762	35,568,514	87.2	89.9	1.4	1.6	11.4	8.5
Maryland	49,928	41,487	----------	----------	33,527	38,728	83,455	80,215	83,455	80,215	59.8	51.7	------	------	40.2	48.3
Montana (bituminous)	418,917	361,510	----------	----------	----------	10,277	418,917	371,787	418,917	371,787	100.0	97.2	------	------	------	2.8
Montana (lignite)	6,973	(2)	----------	(2)	----------	(2)	6,973	(2)	6,973	(2)	100.0	(2)	------	(2)	------	(2)
New Mexico	411,450	52,839	----------	----------	2,200	1,000	413,650	53,839	417,596	60,229	99.5	98.1	------	------	.5	1.9
North Dakota (lignite)	152,365	(2)	----------	(2)	----------	(2)	152,365	(2)	152,365	(2)	100.0	(2)	------	(2)	------	(2)
Ohio	9,881,773	8,036,536	1,263,956	1,175,606	186,667	190,222	11,332,396	9,402,364	11,337,655	9,409,125	87.2	85.5	11.2	12.5	1.6	2.0
Oklahoma	72,202	50,614	----------	----------	730,613	665,037	802,815	715,651	802,815	715,651	9.0	7.1	------	------	91.0	92.9
Pennsylvania	47,572,923	36,491,372	5,601,520	7,911,010	4,390,283	3,045,727	57,564,726	47,448,109	62,520,552	49,040,310	82.7	76.9	9.7	16.7	7.6	6.4
Tennessee	1,509,785	1.554,441	----------	----------	370,111	198,715	1,879,896	1,753,156	2,041,452	1,889,159	80.3	88.7	------	------	19.7	11.3
Utah	6,292,666	4,675,406	134,946	283,571	32,770	8,403	6,460,382	4,967,380	6,470,038	4,967,754	97.4	94.1	2.1	5.7	.5	.2
Virginia	8,443,539	7,813,715	55,588	311,016	835,513	521,116	9,334,640	8,645,847	11,180,644	9,284,166	90.5	90.4	.6	3.6	8.9	6.0
Washington	88,868	123,480	228,814	155,505	191,871	251,338	509,553	530,323	510,246	553,629	17.4	22.3	44.9	29.7	37.7	48.0
West Virginia	88,639,201	85,346,615	1,579,495	2,566,997	12,448,447	5,895,666	102,667,143	93,809,278	110,376,391	98,047,553	86.3	91.0	1.6	2.7	12.1	6.3
Wyoming	3,303,072	1,228,984	125,820	79,252	92,782	63,482	3,521,674	1,371,718	3,522,174	1,378,279	93.8	88.6	3.6	6.3	2.6	5.1
Lignite	----------	[3] 20,140	----------	----------	----------	----------	----------	20,140	----------	[3] 20,140	------	[3] 100.0	------	------	------	------
Total	241,354,937	211,628,819	11,830,097	16,335,739	25,143,948	15,005,091	278,328,982	242,969,649	297,160,390	251,912,431	86.7	87.1	4.3	6.7	9.0	6.2

[1] Includes mobile loading machines, scrapers, and conveyers equipped with duckbills or other self-loading heads.
[2] Included in lignite total; not published to avoid disclosure of individual operations.
[3] Includes lignite in Montana and North Dakota.

TABLE 36.—Number of underground bituminous-coal and lignite mines using mechanical loading devices and number of units in use in the United States, 1953–54, by States

State	Number of mines										Number of loading devices									
											Loading machines									
	Using loading machines only [1]		Using continuous-mining machines only		Using hand-loaded conveyors only		Using more than one type of mechanical loading		Total		Mobile loading machines		Scrapers		Duckbills or other self-loading conveyors		Continuous-mining machines		Hand-loaded conveyors (number of units)	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	19	20	1	------	11	14	4	5	35	39	123	143	------	------	8	8	8	10	129	113
Alaska	1	3	------	------	------	------	1	2	2	5	3	11	10	14	------	------	------	2	3	------
Arkansas	------	------	------	------	13	10	------	------	13	10	------	------	------	------	------	------	------	------	64	38
Colorado	34	31	2	1	18	18	6	7	60	57	36	57	------	2	159	109	5	4	52	64
Illinois	70	61	1	1	2	1	3	3	76	66	309	274	------	------	8	11	20	22	5	4
Indiana	22	24	------	------	------	------	------	2	22	26	107	92	------	------	------	------	------	4	------	------
Iowa	3	4	------	------	------	------	------	------	3	4	2	5	------	------	1	1	------	------	------	------
Kentucky	109	130	1	1	33	28	25	15	168	174	471	585	------	------	77	31	13	14	449	286
Maryland	1	2	------	------	3	2	------	------	4	4	------	2	------	------	2	2	------	------	10	6
Montana (bituminous)	10	9	------	------	------	2	------	------	10	11	29	17	------	------	6	8	------	------	------	3
Montana (lignite)	1	(2)	------	(2)	------	(2)	------	(2)	1	(2)	2	(2)	------	(2)	------	(2)	------	(2)	------	(2)
New Mexico	3	2	------	------	1	1	------	------	4	3	16	16	4	------	1	------	------	------	1	1
North Dakota (lignite)	2	(2)	------	(2)	------	(2)	------	(2)	2	(2)	4	(2)	------	(2)	------	(2)	------	(2)	------	(2)
Ohio	34	29	5	4	13	12	7	5	59	50	164	173	------	1	24	18	17	12	34	40
Oklahoma	------	------	------	------	6	6	1	2	7	8	5	7	------	------	------	------	------	------	127	117
Pennsylvania	103	93	3	7	94	102	47	47	247	249	927	972	9	12	85	81	112	153	581	531
Tennessee	8	11	------	------	4	5	3	2	15	18	28	31	------	------	13	14	------	------	41	25
Utah	38	36	------	------	5	1	1	1	44	38	123	146	------	------	35	37	2	6	10	3
Virginia	26	29	------	------	8	6	9	11	43	46	144	168	------	1	24	39	2	5	95	69
Washington	3	2	------	------	------	------	5	5	8	7	------	4	6	11	9	6	6	7	86	78
West Virginia	227	225	------	2	78	62	82	66	387	355	1,456	1,564	------	3	218	106	32	84	1,278	758
Wyoming	9	9	------	1	2	3	5	2	16	15	36	44	------	4	179	162	2	2	29	26
Lignite	------	[3] 2	------	------	------	------	------	------	------	[3] 2	------	[3] 3	------	------	------	------	------	------	------	------
Total	723	722	13	17	291	273	199	175	1,226	1,187	3,985	4,314	29	48	840	633	219	325	2,994	2,162

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.
[2] Included in lignite total; not published to avoid disclosure of individual operations.
[3] Includes lignite in Montana and North Dakota.

TABLE 37.—Underground production at bituminous-coal and lignite mines in the United States, 1953–54, by States and methods of loading

State	Hand-loaded (net tons)		Mechanically loaded (net tons)		Total underground production (net tons)		Underground output hand-loaded (percent)		Underground output mechanically loaded (percent)	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	1, 462, 966	907, 443	9, 453, 963	7, 832, 606	10, 916, 929	8, 740, 049	13. 4	10. 4	86. 6	89. 6
Alaska	359, 841	124, 516	67, 000	149, 076	426, 841	273, 592	84. 3	45. 5	15. 7	54. 5
Arizona	5, 140	10, 925	------	------	5, 140	10, 925	100. 0	100. 0	------	------
Arkansas	52, 407	11, 135	343, 238	242, 227	395, 645	253, 362	13. 2	4. 4	86. 8	95. 6
Colorado	905, 750	672, 408	2, 300, 834	1, 929, 985	3, 206, 584	2, 602, 393	28. 2	25. 8	71. 8	74. 2
Georgia	14, 100	8, 090	------	------	14, 100	8, 090	100. 0	100. 0	------	------
Illinois	804, 276	560, 223	28, 524, 928	24, 956, 427	29, 329, 204	25, 516, 650	2. 7	2. 2	97. 3	97. 8
Indiana	182, 877	156, 027	5, 999, 143	4, 730, 906	6, 182, 020	4, 886, 933	3. 0	3. 2	97. 0	96. 8
Iowa	405, 573	255, 751	8, 250	81, 968	413, 823	337, 719	98. 0	75. 7	2. 0	24. 3
Kansas	29, 705	24, 392	------	------	29, 705	24, 392	100. 0	100. 0	------	------
Kentucky	18, 185, 835	11, 710, 881	36, 483, 041	33, 876, 647	54, 668, 876	45, 587, 528	33. 3	25. 7	66. 7	74. 3
Maryland	218, 462	147, 966	83, 455	80, 215	301, 917	228, 181	72. 4	64. 8	27. 6	35. 2
Missouri	151, 096	153, 150	------	------	151, 096	153, 150	100. 0	100. 0	------	------
Montana (bituminous)	8, 278	25, 654	418, 917	371, 787	427, 195	397, 441	1. 9	6. 5	98. 1	93. 5
Montana (lignite)	15, 175	(1)	6, 973	(1)	22, 148	(1)	68. 5	(1)	31. 5	(1)
New Mexico	83, 406	48, 260	413, 650	53, 839	497, 056	102, 099	16. 8	47. 3	83. 2	52. 7
North Dakota (lignite)	9, 073	(1)	152, 365	(1)	161, 438	(1)	5. 6	(1)	94. 4	(1)
Ohio	1, 652, 537	1, 533, 757	11, 332, 396	9, 402, 364	12, 984, 933	10, 936, 121	12. 7	14. 0	87. 3	86. 0
Oklahoma	71, 351	23, 499	802, 815	715, 651	874, 166	739, 150	8. 2	3. 2	91. 8	96. 8
Pennsylvania	15, 490, 384	7, 596, 488	57, 564, 726	47, 448, 109	73, 055, 110	55, 044, 597	21. 2	13. 8	78. 8	86. 2
Tennessee	2, 842, 607	3, 149, 837	1, 879, 896	1, 753, 156	4, 722, 503	4, 902, 993	60. 2	64. 2	39. 8	35. 8
Utah	83, 763	40, 572	6, 460, 382	4, 967, 380	6, 544, 145	5, 007, 952	1. 3	. 8	98. 7	99. 2
Virginia	8, 208, 880	6, 661, 643	9, 334, 640	8, 645, 847	17, 543, 520	15, 307, 490	46. 8	43. 5	53. 2	56. 5
Washington	90, 705	29, 958	509, 553	530, 323	600, 258	560, 281	15. 1	5. 4	84. 9	94. 6
West Virginia	19, 869, 634	12, 239, 990	102, 667, 143	93, 809, 278	122, 536, 777	106, 049, 268	16. 2	11. 5	83. 8	88. 5
Wyoming	18, 169	22, 985	3, 521, 674	1, 371, 718	3, 539, 843	1, 394, 703	. 5	1. 6	99. 5	98. 4
Lignite	------	[2] 26, 832	------	[2] 20, 140	------	[2] 46, 972	------	[2] 57. 1	------	[2] 42. 9
Total	71, 221, 990	46, 142, 382	278, 328, 982	242, 969, 649	349, 550, 972	289, 112, 031	20. 4	16. 0	79. 6	84. 0

[1] Included in lignite total; not published to avoid disclosure of individual operations.

[2] Includes lignite in Montana and North Dakota.

TABLE 38.—Units of mechanical loading equipment sold to bituminous-coal and lignite mines for underground use in the United States, as reported by manufacturers, 1947–54

Type of equipment	1947	1948	1949	1950	1951	1952	1953	1954	Change from 1953 (percent)
Mobile loading machines	485	[1] 723	[1] 286	[1] 289	[1] 287	[1] 206	180	92	−48.9
Continuous-mining machines	--------	(1)	(1)	(1)	(1)	(1)	67	101	+50.7
Scrapers	12	17	8	1	4	8	11	5	−54.5
Conveyors [2]	846	1,025	394	316	297	155	87	61	−29.9
Total	1,343	1,765	688	606	588	369	345	259	−24.9
Number of manufacturers reporting	23	22	22	20	21	22	25	23	--------

[1] Continuous-mining machines included with mobile loading machines.

[2] Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads.

TABLE 39.—Units of mechanical loading equipment sold for use in bituminous-coal and lignite mines in the United States, as reported by manufacturers, 1953–54, by States

State	Mobile loading machines		Continuous-mining machines		Scrapers		Room conveyors [1]	
	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	8	12	2	2	--------	--------	1	1
Alaska	--------	2	--------	2	6	--------	--------	3
Colorado	1	1	--------	--------	--------	1	--------	--------
Illinois	4	1	--------	6	--------	--------	--------	--------
Indiana	7	1	3	--------	--------	--------	--------	--------
Kentucky	18	17	2	--------	--------	--------	17	15
Maryland	--------	--------	--------	--------	--------	--------	--------	1
Ohio	--------	--------	3	1	--------	--------	6	1
Pennsylvania	40	5	40	38	4	2	7	--------
Tennessee	2	--------	--------	--------	--------	--------	--------	--------
Utah	8	5	2	3	1	--------	--------	--------
Virginia	22	11	2	2	--------	--------	5	10
Washington	--------	--------	1	--------	--------	--------	--------	--------
West Virginia	65	37	12	47	--------	--------	51	30
Wyoming	5	--------	--------	--------	--------	2	--------	--------
Total	180	92	67	101	11	5	87	61

[1] Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads.

MECHANICAL CLEANING

Although mechanical cleaning of bituminous coal in the United States started about 1875, complete data begin with 1927, when 28 million tons—5 percent of the total output—was cleaned. The percentage of total production mechanically cleaned has increased each year from the previous year, except in 1945, when it remained the same. In 1954 coal mechanically cleaned composed 59 percent of the total production. The refuse handled at cleaning plants increased from 3 million tons (9 percent of the raw coal that entered the cleaning plants) in 1929 to 54 million tons (19 percent of the raw coal cleaned) in 1954. This increase in refuse was due to many factors, but the main one was increased mechanization, both in underground loading and strip mining. (See tables 41 and 42.)

TABLE 40.—Units of conveying equipment sold for use in bituminous-coal and lignite mines in the United States, as reported by manufacturers, 1953–54, by States

State	Face conveyors [1]		Shuttle cars		"Mother" conveyors [2]	
	1953	1954	1953	1954	1953	1954
Alabama	--------	--------	27	26	3	--------
Colorado	--------	--------	2	--------	1	1
Illinois	--------	--------	17	1	12	6
Indiana	--------	--------	6	2	--------	2
Kentucky	8	23	49	36	5	--------
Maryland	--------	1	--------	--------	--------	--------
Ohio	--------	--------	7	--------	--------	1
Oklahoma	--------	--------	--------	--------	3	--------
Pennsylvania	1	--------	140	42	14	3
Tennessee	--------	--------	2	--------	--------	--------
Utah	--------	--------	10	8	1	1
Virginia	1	14	45	15	1	--------
West Virginia	39	77	118	112	18	5
Wyoming	--------	--------	14	--------	--------	--------
Total	49	115	437	242	58	19

[1] Includes "Bridge" conveyors and all other conveyors 10 to 100 feet long.

[2] Includes all haulage conveyors with capacity over 500 feet, except main-slope conveyors.

TABLE 41.—Growth of mechanical cleaning at bituminous-coal and lignite mines in the United States, 1927–54

Year	Total production (thousand tons)	Mechanical cleaning					Percentage of total production mechanically cleaned
		Number of cleaning plants	Raw coal (thousand tons)	Cleaned coal (thousand tons)	Refuse (thousand tons)	Percentage refuse is of raw coal	
1927	517,763	(1)	(1)	27,692	(1)	(1)	5.3
1928	500,745	236	(1)	28,783	(1)	(1)	5.7
1929	534,989	280	40,241	36,799	3,442	8.6	6.9
1930	467,526	297	42,645	38,800	3,845	9.0	8.3
1931	382,089	312	39,529	36,172	3,357	8.5	9.5
1932	309,710	309	32,903	30,278	2,625	8.0	9.8
1933	333,630	290	37,682	34,558	3,124	8.3	10.4
1934	359,368	293	43,556	39,827	3,729	8.6	11.1
1935	372,373	320	49,473	45,361	4,112	8.3	12.2
1936	439,088	342	67,162	61,095	6,067	9.0	13.9
1937	445,531	(1)	(1)	65,000	(1)	(1)	14.6
1938	348,545	374	71,207	63,455	7,752	10.9	18.2
1939	394,855	366	88,895	79,429	9,466	10.6	20.1
1940	460,771	387	115,692	102,270	13,422	11.6	22.2
1941	514,149	417	133,379	117,540	15,839	11.9	22.9
1942	582,693	438	162,598	142,187	20,411	12.6	24.4
1943	590,177	432	167,310	145,576	21,734	13.0	24.7
1944	619,576	439	182,071	158,727	23,344	12.8	25.6
1945	577,617	439	172,899	147,886	25,013	14.5	25.6
1946	533,922	445	163,633	138,670	24,963	15.3	26.0
1947	630,624	461	206,620	174,436	32,184	15.6	27.7
1948	599,518	502	215,217	180,880	34,337	16.0	30.2
1949	437,868	571	184,691	153,652	31,039	16.8	35.1
1950	516,311	612	238,391	198,699	39,692	16.7	38.5
1951	533,665	631	289,838	240,010	49,828	17.2	45.0
1952	466,841	625	274,246	227,265	46,981	17.1	48.7
1953	457,290	611	295,654	241,759	53,895	18.2	52.9
1954	391,706	613	287,004	232,764	54,240	18.9	59.4

[1] Data not available.

Mechanical cleaning refers to cleaning with mechanical devices that effect the separation of impurities from raw coal usually by differences in specific gravity and does not include coal that is screened only. These mechanical devices are divided into two general classes—wet and pneumatic. About 95 percent of the coal cleaned in 1954 was cleaned by various wet methods. Approximately half of all the bituminous coal cleaned in the United States is cleaned with jigs. (See table 43.) A detailed description of the various types of mechanical cleaning equipment is given in Minerals Yearbook, volume II, Fuels, 1953, pp. 94–96.

In recent years the movement of raw coal to cleaning plants has become so complicated that it is almost impossible to determine the total production of the mines that move coal to cleaning plants. A new table is included in this chapter to replace the various tables in previous chapters that showed the total production at mines served by cleaning plants. In this new arrangement the coal cleaned was tabulated by types of mining under the State from which the coal was mined. (See tables 44 and 45.) The cleaning plant has been credited to the State from which the major portion of the coal was mined.

TABLE 42.—Mechanical cleaning at bituminous-coal and lignite mines in the United States, 1954, by States

State	Total production (net tons)	Mechanical cleaning					Percentage of total production mechanically cleaned
		Number of cleaning plants	Raw coal (net tons)	Cleaned coal (net tons)	Refuse (net tons)	Percentage refuse is of raw coal	
Alabama	10,282,506	49	14,489,320	9,173,047	5,316,273	36.7	89.2
Alaska	666,61[illegible]	2	352,966	221,453	131,513	37.3	33.2
Arkansas	477,268	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	2,899,791	[2] 4	[2] 1,242,251	[2] 1,073,254	[2] 168,997	[2] 13.6	[2] 31.8
Illinois	41,971,139	66	42,477,690	35,116,921	7,360,769	17.3	83.7
Indiana	13,400,188	25	12,551,675	10,762,266	1,789,409	14.3	80.3
Kansas	1,372,[illegible]	5	1,661,750	1,229,962	431,788	26.0	89.6
Kentucky	56,964,408	82	38,474,881	32,878,696	5,596,185	14.5	57.7
Missouri	2,513,593	8	3,129,286	2,299,225	830,061	26.5	91.5
Montana (bituminous)	1,490,846	3	14,357	12,757	1,600	11.1	.9
New Mexico	123,099	1	85,788	73,272	12,516	14.6	59.5
Ohio	32,468,728	24	17,113,015	13,443,275	3,669,740	21.4	41.4
Oklahoma	1,914,834	4	830,908	685,426	145,482	17.5	35.8
Pennsylvania	72,010,101	96	55,193,543	44,214,865	10,978,678	19.9	61.4
Tennessee	6,428,831	7	543,257	472,119	71,138	13.1	7.3
Utah	5,007,952	4	2,517,999	2,073,706	444,293	17.6	41.4
Virginia	16,387,292	29	10,123,309	8,460,496	1,662,813	16.4	51.6
Washington	619,209	10	944,965	592,612	352,353	37.3	95.7
West Virginia	115,996,041	193	85,245,648	69,969,941	15,275,707	17.9	60.3
Wyoming	2,831,430	1	11,800	10,730	1,070	9.1	.4
Other States [3]	5,880,135						
Total	391,706,300	613	287,004,408	232,764,023	54,240,385	18.9	59.4

[1] Included in Colorado.

[2] Includes Arkansas.

[3] Includes Arizona, California lignite, Georgia, Iowa, Maryland, Montana lignite, North Dakota lignite, South Dakota lignite, and Texas lignite.

TABLE 43.—Mechanical cleaning of bituminous coal and lignite in the United States, 1927–54, by types of equipment

Year	Wet methods								Pneumatic methods	Total
	Jigs	Concentrating tables	Classifiers	Launders	Dense-medium processes	Jigs and tables	Other combinations	Total		
	THOUSAND NET TONS OF CLEAN COAL									
1927	18,741	3,200	(1)	[1] 1,000	(1)	300	800	24,041	3,651	27,692
1928	17,927	3,412	(1)	[1] 2,446	(1)	1,056	156	24,997	3,786	28,783
1929	18,915	3,532	(1)	[1] 7,103	(1)	1,214	191	30,955	5,844	36,799
1930	17,724	2,272	(1)	[1] 9,818	(1)	1,029	62	30,905	7,895	38,800
1931	13,957	1,551	(1)	[1] 11,213	(1)	926	11	27,658	8,514	36,172
1932	9,963	821	(1)	[1] 12,140	(1)	806	9	23,739	6,539	30,278
1933	11,895	1,119	(1)	[1] 13,272	(1)	693	5	26,984	7,574	34,558
1934	14,012	1,116	(1)	[1] 15,168	(1)	1,227	6	31,529	8,298	39,827
1935	15,735	1,118	(1)	[1] 18,454	(1)	1,549	----------	36,856	8,505	45,361
1936	23,417	1,843	(1)	[1] 22,631	(1)	2,613	----------	50,504	10,591	61,095
1937	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	65,000
1938	27,615	984	4,521	10,681	4,450	2,791	2,145	53,187	10,268	63,455
1939	37,056	1,402	5,917	12,809	4,683	3,256	2,611	67,734	11,695	79,429
1940	47,064	2,330	7,762	16,269	6,692	2,765	4,408	87,290	14,980	102,270
1941	53,287	2,510	8,177	16,954	9,344	4,364	5,742	100,378	17,162	117,540
1942	66,876	3,138	10,529	18,658	12,495	4,366	5,938	122,000	20,187	142,187
1943	66,092	2,929	11,854	17,424	13,388	4,322	8,366	124,375	21,201	145,576
1944	74,175	2,753	14,780	19,686	13,869	4,649	8,751	138,663	20,064	158,727
1945	68,609	2,594	14,203	18,980	12,875	4,754	8,455	130,470	17,416	147,886
1946	64,702	1,447	13,883	16,021	14,173	3,776	8,057	122,059	16,611	138,670
1947	85,931	2,980	14,648	17,902	17,702	4,303	12,617	156,083	18,353	174,436
1948	87,506	4,360	18,304	16,788	20,638	5,252	11,816	164,664	16,216	180,880
1949	72,423	4,040	14,865	11,238	17,821	3,288	17,033	140,708	12,944	153,652
1950	94,161	4,693	18,059	11,630	28,948	6,153	19,526	183,170	15,529	198,699
1951	101,746	5,811	23,174	10,362	33,840	7,613	38,884	221,430	18,580	240,010
1952	97,336	3,723	19,296	11,738	31,321	8,280	36,925	208,619	18,646	227,265
1953	101,001	4,002	18,312	11,988	36,805	8,647	41,739	222,494	19,265	241,759
1954	99,913	6,606	16,115	12,156	43,104	9,024	27,119	214,037	18,727	232,764
	PERCENTAGE CLEANED BY EACH TYPE									
1927	67.6	11.6	(1)	[1] 3.6	(1)	1.1	2.9	86.8	13.2	100.0
1928	62.3	11.8	(1)	[1] 8.5	(1)	3.7	.5	86.8	13.2	100.0
1929	51.4	9.6	(1)	[1] 19.3	(1)	3.3	.5	84.1	15.9	100.0
1930	45.6	5.9	(1)	[1] 25.3	(1)	2.7	.2	79.7	20.3	100.0
1931	38.6	4.3	(1)	[1] 31.0	(1)	2.6	----------	76.5	23.5	100.0
1932	32.8	2.7	(1)	[1] 40.2	(1)	2.7	----------	78.4	21.6	100.0
1933	34.4	3.2	(1)	[1] 38.5	(1)	2.0	----------	78.1	21.9	100.0
1934	35.2	2.8	(1)	[1] 38.1	(1)	3.1	----------	79.2	20.8	100.0
1935	34.7	2.5	(1)	[1] 40.7	(1)	3.4	----------	81.3	18.7	100.0
1936	38.3	3.0	(1)	[1] 37.1	(1)	4.3	----------	82.7	17.3	100.0
1937	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	100.0
1938	43.5	1.6	7.1	16.8	7.0	4.4	3.4	83.8	16.2	100.0
1939	46.6	1.8	7.5	16.1	5.9	4.1	3.3	85.3	14.7	100.0
1940	46.0	2.3	7.6	15.9	6.5	2.7	4.3	85.3	14.7	100.0
1941	45.3	2.2	7.0	14.4	7.9	3.7	4.9	85.4	14.6	100.0
1942	47.0	2.2	7.4	13.1	8.8	3.1	4.2	85.8	14.2	100.0
1943	45.4	2.0	8.1	12.0	9.2	3.0	5.7	85.4	14.6	100.0
1944	46.7	1.8	9.3	12.4	8.8	2.9	5.5	87.4	12.6	100.0
1945	46.4	1.8	9.6	12.8	8.7	3.2	5.7	88.2	11.8	100.0
1946	46.7	1.0	10.0	11.6	10.2	2.7	5.8	88.0	12.0	100.0
1947	49.3	1.7	8.4	10.3	10.1	2.5	7.2	89.5	10.5	100.0
1948	48.4	2.4	10.1	9.3	11.4	2.9	6.5	91.0	9.0	100.0
1949	47.1	2.6	9.7	7.3	11.6	2.2	11.1	91.6	8.4	100.0
1950	47.4	2.4	9.1	5.8	14.6	3.1	9.8	92.2	7.8	100.0
1951	42.4	2.4	9.7	4.3	14.1	3.2	16.2	92.3	7.7	100.0
1952	42.8	1.6	8.5	5.2	13.8	3.6	16.3	91.8	8.2	100.0
1953	41.8	1.6	7.6	4.9	15.2	3.6	17.3	92.0	8.0	100.0
1954	42.8	3.0	5.7	3.9	21.8	3.5	14.4	95.1	4.9	100.0

[1] Launders include classifiers and dense-medium processes for 1927–36, inclusive.
[2] Data not available.

TABLE 44.—Mechanical cleaning at bituminous-coal and lignite mines in the United States, 1953, by States and by underground, strip, and auger mining

State	Underground mines			Strip mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama	10, 916, 929	10, 196, 925	93. 4	1, 615, 132	913, 424	56. 6
Alaska	426, 841	253, 570	59. 4	434, 630	------	------
Arkansas	395, 645	(1)	(1)	379, 562	(1)	(1)
Colorado	3, 206, 584	[2] 1, 006, 063	[2] 27. 9	368, 266	[2] 371, 864	[2] 49. 7
Illinois	29, 329. 204	19, 831, 727	67. 6	16, 680, 687	15, 625, 243	93. 7
Indiana	6, 182, 020	4. 586, 043	74. 2	9, 630. 465	8, 064, 577	83. 7
Kansas	29, 705	------	------	1, 685, 299	1, 238, 187	73. 5
Kentucky	54, 668, 876	20, 797, 282	38. 0	10, 319, 606	7, 336, 868	71. 1
Missouri	151, 096	10, 000	6. 6	2, 242, 208	2, 146, 543	95. 7
Montana (bituminous)	427, 195	45, 035	10. 5	1, 421, 139	------	------
New Mexico	497, 056	335, 633	67. 5	16, 725	------	------
Ohio	12, 984, 933	7, 667, 924	59, 1	21, 612, 793	5, 908, 266	27. 3
Oklahoma	874, 166	412, 090	47. 1	1, 293, 428	211, 379	16. 3
Pennsylvania	73, 055, 110	46, 521, 253	63. 7	20, 175, 310	2, 242, 243	11. 1
Tennessee	4, 722, 503	535, 462	11. 3	675, 276	------	------
Utah	6, 544, 145	2, 540, 571	38. 8	------	------	------
Virginia	17, 543, 520	6, 573, 519	37. 5	1, 303, 648	590, 311	45. 3
Washington	600. 258	588, 491	98. 0	89, 573	82, 755	92. 4
West Virginia	122, 536, 777	73, 033, 011	59. 6	9, 936, 129	1, 470, 848	14. 8
Other States [3]	4, 458, 409	------	------	5, 568, 693	------	------
Total	349, 550, 972	194, 934, 599	55. 8	105, 448, 569	46, 202, 508	43. 8

State	Auger mines			Total, all mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama	------	------	------	12, 532, 061	11, 110, 349	88. 7
Alaska	------	------	------	861, 471	253, 570	29. 4
Arkansas	------	------	------	775, 207	(1)	(1)
Colorado	------	------	------	3, 574, 850	[2] 1, 377, 927	[2] 31. 7
Illinois	------	------	------	46, 009, 891	35, 456, 970	77. 1
Indiana	------	------	------	15, 812, 485	12, 650, 620	80. 0
Kansas	------	------	------	1, 715, 004	1, 238, 187	72. 2
Kentucky	71, 996	10, 573	14. 7	65, 060, 478	28, 144, 723	43. 3
Missouri	------	------	------	2, 393, 304	2, 156, 543	90. 1
Montana (bituminous)	------	------	------	1. 848, 334	45, 035	2. 4
New Mexico	------	------	------	513, 781	335, 633	65. 3
Ohio	139, 047	------	------	34, 736, 773	13, 576, 190	39. 1
Oklahoma	------	------	------	2, 167, 594	623, 469	28. 8
Pennsylvania	100. 451	12, 975	12. 9	93, 330, 871	48, 776, 471	52. 3
Tennessee	68, 790	------	------	5, 466, 569	535, 462	9. 8
Utah	------	------	------	6, 544, 145	2, 540, 571	38. 8
Virginia	271, 882	208, 377	76. 6	19, 119, 050	7, 372, 207	38. 6
Washington	------	------	------	689, 831	671, 246	97. 3
West Virginia	1, 632, 404	389, 545	23. 9	134, 105, 310	74, 893, 404	55. 8
Other States [3]	6, 338	------	------	10, 033, 440	------	------
Total	2, 290, 908	621, 470	27. 1	457, 290. 449	241, 758, 577	52. 9

[1] Included in Colorado.

[2] Includes Arkansas.

[3] Includes Arizona, Georgia, Iowa, Maryland, Montana lignite, North Dakota lignite, South Dakota lignite, and Wyoming.

TABLE 45.—Mechanical cleaning at bituminous-coal and lignite mines in the United States, 1954, by States and by underground, strip, and auger mining

State	Underground mines			Strip mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama	8,740,049	8,320,738	95.2	1,542,457	852,309	55.3
Alaska	273,592	141,949	51.9	393,026	79,504	20.2
Arkansas	253,362	(1)	(1)	223,906	(1)	(1)
Colorado	2,602,393	[2] 828,727	[2] 29.0	297,398	[2] 244,527	[2] 46.9
Illinois	25,516,650	19,428,314	76.1	16,454,486	15,688,607	95.3
Indiana	4,886,933	3,765,256	77.0	8.513,255	6,997,010	82.2
Kansas	24,392			1,347,902	1,229,962	91.3
Kentucky	45,587,528	24,373,322	53.5	10,780,058	8,416,057	78.1
Missouri	153,150	41,320	27.0	2,360,443	2,257,905	95.7
Montana (bituminous)	397,441	12,757	3.2	1,093,405		
New Mexico	102,099	73,272	71.8	21,000		
Ohio	10,936,121	5.738,346	52.5	20,579,401	7,696,701	37.4
Oklahoma	739,150	389,097	52.6	1,175,684	296,329	25.2
Pennsylvania	55,044,597	41,833,883	76.0	16,716,668	2,357,982	14.1
Tennessee	4,902,993	450,721	9.2	1,489,220	21,398	1.4
Utah	5,007,952	2,073.706	41.4			
Virginia	15,307,490	8,113,039	53.0	912,671	318,058	34.8
Washington	560,281	553,040	98.7	58,928	39,572	67.2
West Virginia	106,049,268	68,223,836	64.3	7,489,367	1,276,374	17.0
Wyoming	1,394,703	10,730	.8	1,436,727		
Other States [3]	631,887			5,248,248		
Total	289,112,031	184,372,053	63.8	98,134,250	47,772,295	48.7

State	Auger mines			Total, all mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama				10,282,506	9,173,047	89.2
Alaska				666,618	221,453	33.2
Arkansas				477,268	(1)	(1)
Colorado				2,899,791	[2] 1,073,254	[2] 31.8
Illinois				41,971,136	35,116.921	83.7
Indiana				13,400,188	10,762,266	80.3
Kansas				1,372,294	1,229,962	89.6
Kentucky	596,822	89,317	15.0	56,964.408	32,878,696	57.7
Missouri				2,513,593	2,299,225	91.5
Montana (bituminous)				1,490,846	12,757	.9
New Mexico				123,099	73,272	59.5
Ohio	953,206	8,228	.9	32,468,728	13,443,275	41.4
Oklahoma				1,914.834	685.426	35.8
Pennsylvania	248,836	23,000	9.2	72,010.101	44,214,865	61.4
Tennessee	36,618			6,428,831	472,119	7.3
Utah				5,007,952	2,073,706	41.4
Virginia	167,131	29,399	17.6	16,387,292	8,460,496	51.6
Washington				619,209	592.612	95.7
West Virginia	2,457,406	469,731	19.1	115,996,041	69,969,941	60.3
Wyoming				2,831,430	10,730	.4
Other States [3]				5,880,135		
Total	4,460,019	619,675	13.9	391,706,300	232,764,023	59.4

[1] Included in Colorado.

[2] Includes Arkansas.

[3] Includes Arizona, California lignite, Georgia, Iowa, Maryland, Montana lignite, North Dakota lignite, South Dakota lignite, and Texas lignite.

MECHANICAL CRUSHING

TABLE 46.—Mechanical crushing of bituminous coal and lignite at mines in the United States, 1940 and 1944–54 [1]

Year	Number of mines crushing coal	Coal crushed (net tons)	Percentage of production crushed at mines where crushing is done	Percentage of total production crushed	Percentage of production mechanically cleaned at mines where crushing is done	Percentage of total production of mines where crushing is done, by method of loading:		
						Mechanically loaded	Hand loaded	Strip mined
1940	716	35,251,061	19.3	7.7	(2)	(2)	(2)	(2)
1944	814	66,460,564	29.6	10.8	(2)	(2)	(2)	(2)
1945	830	70,936,898	32.4	12.3	(2)	(2)	(2)	(2)
1946	851	66,663,732	31.8	12.5	39.9	52.8	19.9	27.3
1947	904	88,985,858	35.7	14.1	41.4	56.0	16.5	27.5
1948	995	91,564,311	36.6	15.3	42.1	59.0	13.3	27.7
1949	1,120	77,327,691	39.0	17.7	47.3	61.4	11.5	27.1
1950	1,210	101,594,731	40.1	19.7	50.6	62.9	11.5	25.6
1951	1,374	118,663,712	39.6	22.2	54.8	65.5	10.2	24.3
1952	1,325	108,102,158	40.5	23.2	59.6	65.3	9.3	25.4
1953	1,239	116,493,415	42.5	25.5	62.7	68.8	7.9	23.3
1954	981	118,185,431	51.0	30.2	69.3	68.8	7.0	24.2

[1] Data not available for 1941–43, inclusive. Lignite and Virginia semianthracite mines are not included in 1940–49, inclusive.

[2] Data not available.

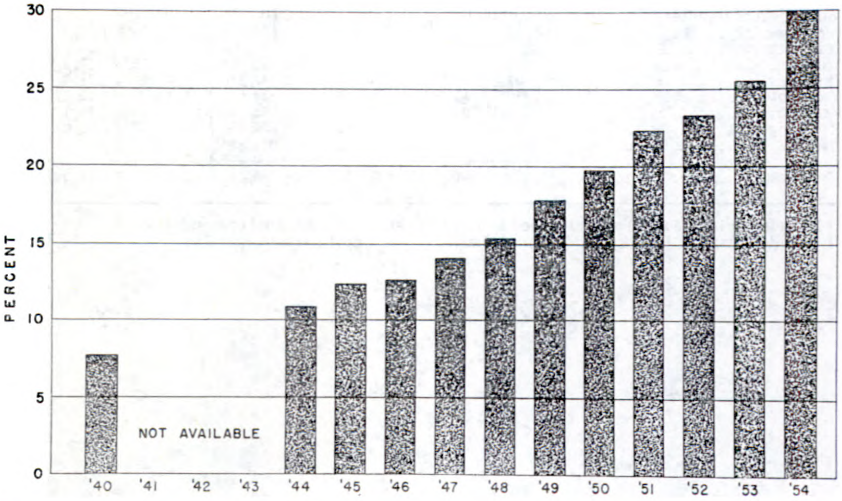

FIGURE 10.—Percentage of total production of bituminous coal and lignite crushed at mines in the United States, 1940 and 1944–54.

TABLE 47.—Mechanical crushing of bituminous coal and lignite at mines in the United States, 1953–54, by States

State	Number of mines crushing coal		Coal crushed (net tons)		Percentage of production crushed at mines where crushing is done		Percentage of total production crushed	
	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	37	17	7, 988, 400	4, 749, 980	81. 8	94. 8	63. 7	46. 2
Alaska	3	5	168, 332	292, 454	46. 8	64. 8	19. 5	43. 9
Arizona	1	------	514	------------	10. 0	------	10. 0	------
Arkansas	7	6	384, 659	166, 895	87. 4	87. 3	49. 6	35. 0
California (lignite)	------	(1)	------------	(1)	------	(1)	------	(1)
Colorado	39	32	1, 537, 001	371, 905	56. 2	29. 9	43. 0	12. 8
Illinois	87	79	13, 741, 865	17, 437, 321	35. 4	47. 5	29. 9	41. 5
Indiana	34	29.	4, 490, 324	4, 479, 438	38. 9	47. 3	28. 4	33. 4
Iowa	23	21	551, 715	484, 808	65. 4	71. 1	39. 7	40. 5
Kansas	5	6	644, 579	1, 061, 757	58. 7	100. 0	37. 6	77. 4
Kentucky	138	130	11, 722, 471	18, 624, 039	32. 5	51. 8	18. 0	32. 7
Maryland	3	3	70, 424	37, 298	85. 4	100. 0	13. 3	8. 8
Missouri	15	10	1, 125, 381	1, 753, 204	50. 7	98. 1	47. 0	69. 7
Montana (bituminous)	7	7	72, 958	115, 650	31. 5	36. 6	3. 9	7. 8
Montana (lignite)	1	(1)	600	(1)	8. 6	(1)	2. 4	(1)
New Mexico	3	2	253, 520	22, 785	61. 6	43. 1	49. 3	18. 5
North Dakota (lignite)	13	(1)	2, 254, 404	(1)	87. 7	(1)	80. 4	(1)
Ohio	107	96	9, 976, 655	9, 621, 211	56. 9	51. 6	28. 7	29. 6
Oklahoma	13	14	1, 133, 519	939, 014	70. 6	74. 9	52. 3	49. 0
Pennsylvania	316	209	31, 242, 011	19, 806, 203	55. 7	54. 3	33. 5	27. 5
South Dakota (lignite)	------	(1)	------------	(1)	------	(1)	------	(1)
Tennessee	15	14	658, 101	605, 638	41. 0	61. 9	12. 0	9. 4
Texas (lignite)	------	(1)	------------	(1)	------	(1)	------	(1)
Utah	34	26	3, 744, 133	3, 116, 016	60. 5	79. 3	57. 2	62. 2
Virginia	37	43	2, 811, 516	2, 247, 446	37. 3	28. 3	14. 7	13. 7
Washington	10	10	155, 068	134, 027	27. 9	23. 4	22. 5	21. 6
West Virginia	276	201	20, 233, 076	28, 772, 915	28. 0	44. 0	15. 1	24. 8
Wyoming	15	10	1, 532, 189	1, 330, 587	40. 6	87. 6	29. 2	47. 0
Lignite	------	[2] 11	------------	[2] 2, 014, 840	------	[2] 95. 7	------	[2] 47. 5
Total	1, 239	981	116, 493, 415	118, 185, 431	42. 5	51. 0	25. 5	30. 2

[1] Included in lignite total; not published to avoid disclosure of individual operations.

[2] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

TREATMENT FOR ALLAYING DUST

TABLE 48.—Summary data on treatment of bituminous coal and lignite at mines for allaying dust in the United States, 1940–54 [1]

Year	Grand total production (net tons)	Total production at mines where coal was treated (net tons)	Percentage of production treated at mines where treating is done	Percentage of total production treated	Year	Net tons treated with—				
						Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	460, 771, 500	161, 089, 959	22. 1	7. 7	1940	2, 633, 291	25, 767, 651	4, 428, 113	2, 807, 728	35, 636, 783
1941	514, 149, 245	197, 476, 343	20. 0	7. 7	1941	3, 957, 459	29, 258, 462	2, 482, 899	3, 844, 476	39, 543, 296
1942	582, 692, 937	202, 973, 885	17. 3	6. 0	1942	10, 132 809	11, 302, 020	6, 544, 658	7, 148, 064	35, 127, 551
1943	590, 177, 069	153, 863, 052	17. 3	4. 5	1943	15, 049, 176	1, 720, 176	1, 947, 219	7, 966, 484	26, 683, 055
1944	619, 576, 240	172, 955, 108	17. 8	5. 0	1944	7 276, 702	13, 188, 883	4, 744, 580	5, 562, 565	30, 772, 730
1945	577, 617, 327	166, 935, 955	20. 1	5. 8	1945	5, 115, 090	18, 875, 674	4, 647, 872	4, 910, 602	33, 549, 238
1946	533, 922, 068	166, 814, 848	22. 2	6. 9	1946	4, 957, 622	24, 310, 109	3, 193, 070	4, 572, 360	37, 033, 161
1947	630, 623, 722	195, 840, 059	26. 4	8. 2	1947	5, 822, 483	34, 667, 571	5, 571, 953	5, 732, 101	51, 794, 108
1948	599, 518, 229	196, 600, 489	25. 6	8. 4	1948	6, 275, 121	34, 466, 534	4, 177, 987	5, 462, 054	50, 381, 696
1949	437, 868, 036	160, 978, 742	26. 0	9. 5	1949	3, 670, 170	30, 448, 670	4, 380, 961	3, 275, 151	41, 774, 902
1950	516, 311, 053	210, 083, 657	25. 9	10. 5	1950	4, 643, 186	41, 688, 159	4, 278, 212	3, 724, 314	54. 333, 871
1951	533, 664, 732	228, 802, 637	25. 6	11. 0	1951	4, 694, 938	46, 142, 726	4, 587, 940	3, 172, 205	58, 597, 809
1952	466, 840, 782	211, 437, 141	24. 4	11. 0	1952	4, 954, 080	41, 409, 886	3, 432, 199	1, 772, 111	51, 568, 276
1953	457, 290, 449	206, 374, 498	23. 7	10. 7	1953	3, 362, 552	40, 671, 431	2, 769, 833	2, 154, 985	48, 958, 801
1954	391, 706, 300	202, 098, 539	27. 9	14. 4	1954	2, 959, 979	47, 782, 165	3, 366, 955	2, 255, 872	56, 364, 971

Year	Number of mines treating with—					Year	Percentage of tonnage treated with—				
	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Totals [2]		Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	51	486	22	62	614	1940	7. 4	72. 3	12. 4	7. 9	100. 0
1941	67	564	15	58	668	1941	10. 0	74. 0	6. 3	9. 7	100. 0
1942	167	334	73	117	603	1942	28. 8	32. 2	18. 6	20. 4	100. 0
1943	212	67	28	101	393	1943	56. 4	6. 4	7. 3	29. 9	100. 0
1944	145	192	47	83	434	1944	23. 6	42. 9	15. 4	18. 1	100. 0
1945	105	296	43	67	487	1945	15. 2	56. 3	13. 9	14. 6	100. 0
1946	79	380	41	51	546	1946	13. 4	65. 6	8. 6	12. 4	100. 0
1947	67	384	58	45	546	1947	11. 2	66. 9	10. 8	11. 1	100. 0
1948	68	474	48	46	629	1948	12. 5	68. 4	8. 3	10. 8	100. 0
1949	91	586	62	34	769	1949	8. 8	72. 9	10. 5	7. 8	100. 0
1950	106	688	32	45	838	1950	8. 5	76. 7	7. 9	6. 9	100. 0
1951	98	764	40	27	898	1951	8. 0	78. 8	7. 8	5. 4	100. 0
1952	101	723	30	20	865	1952	9. 6	80. 8	6. 7	3. 4	100. 0
1953	81	681	28	26	785	1953	6. 8	83. 1	5. 7	4. 4	100. 0
1954	83	614	29	29	737	1954	5. 2	84. 8	6. 0	4. 0	100. 0

[1] All items except "Grand total production" exclude lignite and semianthracite, 1940–49. Data for 1940–45 include mines with an average daily production of 50 tons and all mines with rail or river connections regardless of size. Data for 1946–54 include all mines producing 1,000 tons and over. The figures are reasonably comparable for all years.

[2] Because of some mines using more than 1 method of treatment, this total is not the sum of the individual items.

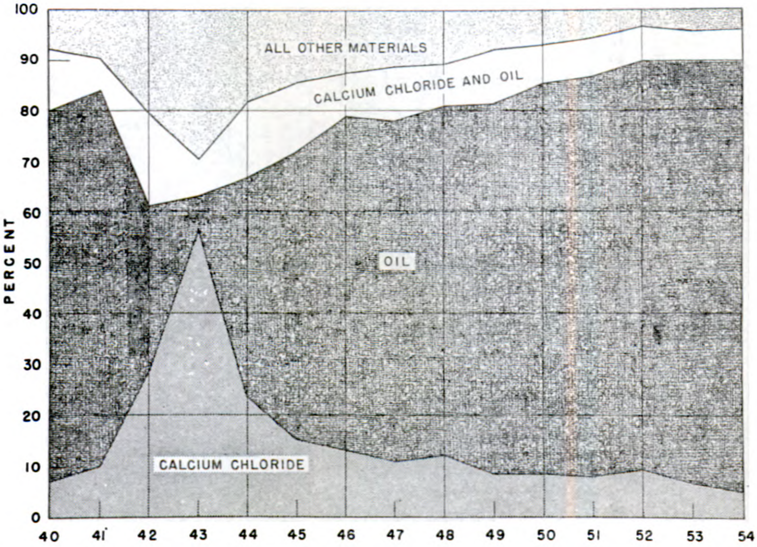

FIGURE 11.—Percentage of total bituminous coal and lignite treated for allaying dust at mines in the United States, 1940–54, by type of agent used.

TABLE 49.—Treatment of bituminous coal and lignite at mines for allaying dust, in the United States, 1953–54, by States

State	Number of mines treating coal		Coal treated (net tons)		Percentage of production treated at mines where treating is done		Percentage of total production treated	
	1953	1954	1953	1954	1953	1954	1953	1954
Alabama	7	11	114,925	98,368	20.1	16.5	0.9	1.0
Arkansas	4	6	38,450	33,035	25.4	24.0	5.0	6.9
California (lignite)	-------	(1)	-------	(1)	-------	(1)	-------	(1)
Colorado	40	38	265,430	272,378	17.3	19.3	7.4	9.4
Illinois	95	80	7,200,126	6,179,525	19.3	17.5	15.6	14.7
Indiana	28	29	1,695,636	1,669,220	14.8	19.0	10.7	12.5
Iowa	5	5	12,614	8,947	14.9	12.8	.9	.7
Kansas	4	3	79,990	107,864	7.1	10.6	4.7	7.9
Kentucky	140	127	9,598,777	13,565,897	29.4	36.9	14.8	23.8
Maryland	-------	1	-------	25,000	-------	90.6	-------	5.9
Missouri	10	9	143,004	165,605	7.5	10.1	6.0	6.6
Montana (bituminous)	8	12	39,374	33,141	17.0	18.1	2.1	2.2
Montana (lignite)	-------	(1)	-------	(1)	-------	(1)	-------	(1)
North Dakota (lignite)	10	(1)	289,574	(1)	14.8	(1)	10.3	(1)
Ohio	23	30	1,886,843	2,428,996	22.7	22.1	5.4	7.5
Oklahoma	9	7	198,109	176,269	20.0	25.6	9.1	9.2
Pennsylvania	107	94	7,057,863	6,617,980	26.4	32.3	7.6	9.2
South Dakota (lignite)	-------	(1)	-------	(1)	-------	(1)	-------	(1)
Tennessee	9	8	211,288	295,954	16.4	32.1	3.9	4.6
Texas (lignite)	-------	(1)	-------	(1)	-------	(1)	-------	(1)
Utah	30	31	2,325,746	1,760,383	52.3	50.9	35.5	35.2
Virginia	42	39	2,963,693	3,272,478	25.6	34.1	15.5	20.0
Washington	2	-------	169	-------	.1	-------	-------	-------
West Virginia	193	179	14,543,556	19,162,813	24.0	29.0	10.8	16.5
Wyoming	19	17	293,634	284,907	9.2	18.5	5.6	10.1
Lignite	-------	[2] 11	-------	[2] 206,211	-------	[2] 7.9	-------	[2] 4.9
Total	785	737	48,958,801	56,364,971	23.7	27.9	10.7	14.4

[1] Included in lignite total; not published to avoid disclosure of individual operations.
[2] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

PRODUCTION BY STATES AND COUNTIES

Detailed production and employment statistics are given in table 50 for each coal-producing county in the United States from which three or more operators submitted reports for 1954. Statistics on counties with less than three reporting producers have been combined with data for other counties in the same State to avoid disclosure of individual figures, unless the operators have granted permission to publish them separately. The production of mines on the border between two States has been credited to the State from which the coal was extracted rather than to that in which the tipple was situated. If the coal was mined from lands in both States, the tonnage was apportioned accordingly.

Bituminous coal and lignite were mined in 27 States and Alaska and 348 counties in 1954. Since soft coal accounts for a very large percentage of the economic activity in many counties, the key items pertaining to the industry are published by counties. These key items—(1) method of shipping the coal, (2) value, (3) number of men working daily, (4) days worked, and (5) tons per man per day—are very helpful in analyzing potential markets by counties.

The most striking thing about the following table is the wide variations among the several counties in the same State; not only production, but even average value and average tons per man per day, varied sharply. The differences in average value are due to quality of coal, method of transportation, or market conditions. The differences in output per man per day are caused largely by physical conditions, mining methods, and extent of mechanization.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ALABAMA									
Bibb	13,264	28,005		41,269	$6.30	126	78	9,833	4.20
Blount	100,219	74,677		174,896	6.70	90	201	18,084	9.67
Cullman	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Jackson		3,348		3,348	6.44	20	80	1,600	2.09
Jefferson	6,662,055	295,211	23,534	6,980,800	6.82	5,684	205	1,165,454	5.99
Marion	61,987	214,985	10	276,982	5.08	335	147	49,134	5.64
St. Clair	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Shelby	2,768	74,429		77,197	6.14	140	176	24,687	3.13
Tuscaloosa	550,703	69,184	1,700	621,587	4.29	310	182	56,459	11.01
Walker	800,488	283,876	999,126	2,083,490	6.54	1,477	163	240,275	8.67
Other counties		22,937		22,937	5.75	35	166	5,820	3.94
Total Alabama	8,191,484	1,066,652	1,024,370	10,282,506	6.55	8,217	191	1,571,346	6.54
ALASKA									
Total Alaska	652,059	10,531	4,028	666,618	$9.66	365	234	85,326	7.81
ARIZONA									
Apache	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Navajo	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties		10,925		10,925	$6.23	25	133	3,332	3.28
Total Arizona		10,925		10,925	6.23	25	133	3,332	3.28

ARKANSAS

Franklin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Johnson	210,193	2,712	501	213,406	$7.59	169	137	23,117	9.23
Logan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sebastian	182,535	44,360	12	226,907	6.90	306	165	50,453	4.50
Other counties	35,336	848	771	36,955	7.52	112	98	10,967	3.37
Total Arkansas	428,064	47,920	1,284	477,268	7.52	587	144	84,537	5.65

CALIFORNIA[6]

COLORADO

Boulder	1,024	32,177	120	33,321	$6.07	71	106	7,517	4.43
Delta	22,909	18,813	922	42,644	5.61	44	149	6,561	6.50
El Paso	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fremont	10,445	168,326	105	178,876	4.09	81	210	17,045	10.49
Garfield	-----	29,800	-----	29,800	6.44	26	195	5,080	5.87
Gunnison	209,156	43,118	14,459	266,733	5.27	240	148	35,626	7.49
Huerfano	22,795	33,056	128	55,979	5.74	64	135	8,651	6.47
Jackson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
La Plata	15,407	24,999	40	40,446	5.05	37	190	7,041	5.74
Las Animas	829,111	29,791	11,379	870,281	7.38	1,176	157	184,138	4.73
Mesa	6,954	29,559	281	36,794	5.98	35	189	6,599	5.58
Moffat	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Montrose	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pitkin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rio Blanco	3,690	14,848	-----	18,538	4.57	10	172	1,715	10.81
Routt	404,067	32,246	7,920	444,233	4.36	342	106	36,274	12.25
Weld	322,924	295,738	8,242	626,904	4.20	370	180	66,593	9.41
Other counties	165,588	67,427	22,227	255,242	5.82	121	233	28,222	9.04
Total Colorado	2,014,070	819,898	65,823	2,899,791	5.54	2,617	157	411,062	7.05

GEORGIA

Walker	-----	8,090	-----	8,090	$5.00	16	98	1,560	5.19

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ILLINOIS									
Bureau	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Christian	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clark	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clay	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clinton	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Douglas	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Franklin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fulton	4,641,385	306,772	12,315	4,960,472	$3.82	1,071	193	207,157	23.95
Gallatin	79,880	16,540	--------	96,420	3.53	99	130	12,889	7.48
Greene	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Grundy	227,459	60,949	787	289,195	5.04	75	200	15,029	19.24
Hancock	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Henry	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Jackson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Jefferson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Kankakee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Knox	1,754,655	43,880	5,862	1,804,397	3.64	404	218	88,265	20.44
La Salle	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Livingston	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Logan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Macoupin	609,856	54,299	18,993	683,148	3.85	746	104	77,707	8.79
Madison	209,661	582,397	23,104	815,162	3.71	546	178	97,359	8.37
Marion	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Menard	--------	11,840	162	12,002	6.38	25	145	3,615	3.32
Montgomery	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Peoria	128,180	290,693	1,259	420,132	4.40	172	173	29,800	14.10
Perry	3,145,905	129,608	15,169	3,290,682	3.52	1,416	127	180,342	18.25
Randolph	1,540,443	93,894	625	1,634,962	3.09	418	184	76,996	21.23
St. Clair	1,203,526	1,613,786	22,620	2,839,932	3.32	954	160	152,624	18.61
Saline	2,326,795	36,725	8,898	2,372,418	4.00	1,420	121	172,506	13.75
Sangamon	--------	117,534	1,273	118,807	5.22	124	126	15,568	7.63
Schuyler	--------	21,639	15	21,654	5.57	39	156	6,092	3.55
Tazewell	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Vermilion	639,281	177,263	3,532	820,076	3.93	212	193	40,878	20.06
Washington	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Will	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Williamson	5,504,311	309,862	18,939	5,833,112	3.79	2,317	176	408,504	14.28
Other counties	14,617,645	1,133,386	207,534	15,958,565	3.99	7,393	168	1,242,567	12.84
Total Illinois	36,628,982	5,001,067	341,087	41,971,136	3.82	17,431	162	2,827,898	14.84

INDIANA

Clay	690, 521	284, 363	3, 669	978, 553	$3. 77	373	170	63, 440	15. 42
Daviess	----------	81, 516	20	81, 536	4. 09	34	187	6, 373	12. 79
Dubois	----------	25, 462	----------	25, 462	3. 45	14	279	3, 910	6. 51
Fountain	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Gibson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Greene	708, 841	97, 035	1, 249	807, 125	3. 88	260	205	53, 376	15. 12
Knox	939, 323	470, 456	3, 886	1, 413, 665	3. 68	469	206	96, 513	14. 65
Owen	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Parke	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Perry	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pike	2, 116, 253	31, 443	6, 495	2, 154, 191	3. 39	433	217	94, 122	22. 89
Spencer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sullivan	1, 275, 485	120, 256	4, 350	1, 400, 091	3. 76	598	139	83, 105	16. 85
Vermillion	107, 889	45, 330	566	153, 785	4. 02	137	102	13, 966	11. 01
Vigo	2, 017, 731	201, 572	483, 289	2, 702, 592	3. 69	1, 366	160	218, 549	12. 37
Warrick	2, 481, 028	311, 202	3, 904	2, 796, 134	3. 47	935	170	158, 632	17. 63
Other counties	654, 764	212, 845	19, 445	887, 054	4. 07	511	170	86, 720	10. 23
Total Indiana	10, 991, 835	1, 881, 480	526, 873	13, 400, 188	3. 65	5, 130	171	878, 706	15. 25

IOWA

Appanoose	68, 625	63, 681	1, 402	133, 708	$4. 77	244	146	35, 658	3. 75
Davis	14, 905	65, 646	99	80, 650	3. 61	40	151	6, 436	12. 53
Lucas	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mahaska	49, 792	98, 290	----------	148, 082	3. 58	41	221	9, 070	16. 33
Marion	412, 581	206, 607	150	619, 338	3. 48	209	216	45, 191	13. 71
Monroe	46, 200	59, 421	547	106, 168	3. 68	96	172	16, 485	6. 44
Page	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Polk	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Van Buren	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Wapello	28, 262	20, 004	----------	48, 266	4. 02	24	241	5, 790	8. 34
Warren	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	24, 324	36, 047	115	60, 486	5. 03	66	123	8, 104	7. 46
Total Iowa	644, 689	549, 696	2, 313	1, 196, 698	3. 76	720	176	126, 734	9. 44

KANSAS

Bourbon	----------	11, 095	366	11, 461	$4. 09	11	81	892	12. 85
Cherokee	481, 355	152, 211	2, 176	635, 742	4. 15	167	244	40, 795	15. 58
Coffey	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Crawford	235, 143	36, 329	2, 981	274, 453	4. 35	282	123	34, 568	7. 94
Labette	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Linn	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Osage	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	432, 850	17, 525	263	450, 638	3. 83	90	201	18, 126	24. 86
Total Kansas	1, 149, 348	217, 160	5, 786	1, 372, 294	4. 08	550	172	94, 381	14. 54

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
KENTUCKY									
Eastern Kentucky:									
Bell	1,049,206	166,707	6,212	1,222,125	$4.64	1,108	158	175,263	6.97
Boyd	160,310	68,140	------	228,450	3.88	126	235	29,596	7.72
Breathitt	737,822	53,355	179	791,356	4.91	528	209	110,141	7.18
Carter	28,648	55,993	61	84,702	4.82	67	182	12,231	6.93
Clay	345,606	203,207	------	548,813	3.97	781	184	143,876	3.81
Clinton	------	14,349	------	14,349	3.56	35	127	4,450	3.22
Elliott	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Floyd	4,450,191	135,971	1,165	4,587,327	5.50	3,475	191	662,518	6.92
Harlan	8,220,285	374,988	49,214	8,644,487	5.75	7,352	183	1,348,144	6.41
Jackson	36,676	73,142	1,380	111,198	4.06	148	188	27,889	3.99
Johnson	152,299	156,587	1,000	309,886	3.80	326	133	43,357	7.15
Knott	542,071	67,460	------	609,531	3.62	304	154	46,700	13.05
Knox	68,826	56,895	------	125,721	3.73	149	129	19,193	6.55
Laurel	28,029	76,995	43	105,067	3.56	145	116	16,754	6.27
Lawrence	------	16,476	------	16,476	4.60	16	131	2,093	7.87
Lee	51,793	39,276	------	91,069	4.57	129	158	20,370	4.47
Leslie	2,118,766	127,695	4,714	2,251,175	3.81	1,467	192	281,362	8.00
Letcher	3,297,860	559,649	6,943	3,864,452	4.85	2,532	167	424,094	9.11
McCreary	268,531	44,979	359	313,869	3.57	214	181	38,647	8.12
Magoffin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Martin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Menifee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Morgan	------	18,577	------	18,577	4.60	24	101	2,426	7.66
Perry	3,885,866	124,105	7,680	4,017,651	4.06	3,025	155	468,605	8.57
Pike	5,354,047	492,747	75,439	5,922,233	4.64	4,266	175	748,584	7.91
Pulaski	------	59,292	------	59,292	3.83	82	148	12,129	4.89
Rockcastle	800	60,013	------	60,813	3.92	44	194	8,520	7.14
Wayne	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Whitley	198,019	76,636	638	275,293	3.65	147	159	23,329	11.80
Wolfe	------	9,257	------	9,257	5.38	13	156	2,027	4.57
Other counties	200,706	29,981	100	230,787	3.47	123	166	20,456	11.28
Total Eastern Kentucky	31,196,357	3,162,472	155,127	34,513,956	4.86	26,626	176	4,692,754	7.35

Western Kentucky:									
Butler	-------	96,863	-------	96,863	3.87	71	202	14,352	6.75
Daviess	365,928	251,356	350	617,634	2.30	165	244	40,299	15.33
Hancock	-------	(5)	-------	(5)	(5)	(5)	(5)	(5)	(5)
Henderson	-------	243,590	3,323	246,913	3.07	195	211	41,061	6.01
Hopkins	12,205,595	260,515	9,038	12,475,148	3.09	3,341	194	649,550	19.21
McLean	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Muhlenberg	4,992,251	108,228	6,147	5,106,626	2.87	1,824	166	302,815	16.86
Ohio	1,634,738	66,284	785	1,701,807	2.87	407	215	87,547	19.44
Union	1,676,634	24,629	13,463	1,714,726	4.00	619	250	154,871	11.07
Webster	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	478,155	12,580	-------	490,735	2.82	75	245	18,404	26.66
Total Western Kentucky	21,353,301	1,064,045	33,106	22,450,452	3.07	6,697	195	1,308,899	17.15
Total Kentucky	52,549,658	4,226,517	188,233	56,964,408	4.16	33,323	180	6,001,653	9.49
MARYLAND									
Allegany	24,396	139,720	303	164,419	$5.16	172	169	29,149	5.64
Garrett	86,729	170,428	40	257,197	4.01	211	191	40,385	6.37
Total Maryland	111,125	310,148	343	421,616	4.46	383	182	69,534	6.06
MISSOURI									
Adair	-------	59,512	1,200	60,712	$4.72	91	166	15,098	4.02
Barton	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Bates	259,857	4,138	157	264,152	3.83	66	255	16,854	15.67
Boone	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Callaway	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clay	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Dade	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Daviess	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Harrison	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Henry	843,195	40,315	231	883,741	3.71	225	179	40,186	21.99
Johnson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Lafayette	-------	16,143	100	16,243	6.09	52	150	7,801	2.08
Macon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Monroe	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Putnam	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Ralls	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Randolph	434,303	61,736	323	496,362	4.05	162	193	31,273	15.87
Ray	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
St. Clair	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Vernon	3,575	13,488	-------	17,063	4.21	19	141	2,674	6.38
Other counties	565,724	208,993	603	775,320	4.22	292	183	53,485	14.50
Total Missouri	2,106,654	404,325	2,614	2,513,593	3.99	907	185	167,371	15.02

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
MONTANA									
Bituminous coal:									
Big Horn	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Blaine	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Carbon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Cascade	100	7,086	------	7,186	$5.04	5	174	872	8.24
Hill	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Musselshell	318,312	41,434	2,377	362,123	4.76	325	129	42,047	8.61
Rosebud	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	1,088,029	30,769	2,739	1,121,537	2.14	108	199	21,454	52.28
Total bituminous coal	1,406,441	79,289	5,116	1,490,846	2.79	438	147	64,373	23.16
Lignite	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
NEW MEXICO									
Colfax	48,399	17,563	1,272	67,234	$6.05	73	153	11,135	6.04
McKinley	21,098	12,935	------	34,033	5.22	30	169	5,064	6.72
Rio Arriba	5,129	5,061	------	10,190	5.65	20	152	3,039	3.35
Sandoval	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
San Juan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Santa Fe	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Socorro	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	3,100	7,792	750	11,642	7.34	62	157	9,727	1.20
Total New Mexico	77,726	43,351	2,022	123,099	5.91	185	157	28,965	4.25
NORTH DAKOTA (LIGNITE) [6]									

OHIO

Athens	216, 801	419, 767	1, 745	638, 313	$4. 16	470	170	80, 036	7. 98
Belmont	5, 936, 078	201, 682	11, 611	6, 149, 371	3. 86	3, 115	177	551, 636	11. 15
Carroll	96, 663	243, 474	1, 066	341, 203	3. 54	183	220	40, 243	8. 48
Columbiana	51, 526	1, 249, 442	7, 160	1, 308, 128	3. 23	369	249	92, 004	14. 22
Coshocton	395, 215	476, 673	205	872, 093	3. 61	329	211	69, 580	12. 53
Gallia	822, 770	59, 352	-----	882, 122	3. 47	287	214	61, 421	14. 36
Guernsey	358, 199	56, 041	109	414, 349	3. 18	138	234	32, 268	12. 84
Harrison	6, 028, 883	184, 200	19, 626	6, 232, 709	3. 82	1, 682	187	314, 778	19. 80
Hocking	6, 802	124, 610	-----	131, 412	3. 35	62	205	12, 695	10. 35
Holmes	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Jackson	352, 183	128, 837	409	481, 429	3. 96	142	208	29, 564	16. 28
Jefferson	3, 154, 974	1, 178, 256	9, 315	4, 342, 545	3. 85	1, 354	222	301, 151	14. 42
Lawrence	60, 000	351, 557	184	411, 741	3. 40	122	203	24, 768	16. 62
Mahoning	7, 038	660, 135	128	667, 301	3. 81	139	274	38, 118	17. 51
Meigs	744, 398	121, 608	20	866, 026	3. 14	281	215	60, 360	14. 35
Morgan	10, 254	9, 852	1, 001, 172	1, 021, 278	3. 05	113	201	22, 762	44. 87
Muskingum	673, 135	370, 401	100	1, 043, 636	2. 74	281	216	60, 770	17. 17
Noble	1, 187, 931	114, 102	587	1, 302, 620	2. 59	256	215	55, 038	23. 67
Perry	1, 468, 115	371, 356	895	1, 840, 366	3. 82	608	194	117, 851	15. 62
Portage	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Stark	-----	705, 919	93, 791	799, 710	2. 83	260	246	64, 006	12. 49
Tuscarawas	217, 512	1, 985, 015	28, 650	2, 231, 177	3. 68	848	234	198, 716	11. 23
Vinton	53, 108	117, 731	100	170, 939	4. 45	97	207	20, 099	8. 50
Washington	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Wayne	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	21, 057	299, 203	-----	320, 260	3. 22	92	284	26, 095	12. 27
Total Ohio	21, 862, 642	9, 429, 213	1, 176, 873	32, 468, 728	3. 62	11, 228	203	2, 273, 959	14. 28

OKLAHOMA

Coal	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Craig	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Haskell	439, 760	3, 300	253	443, 313	$6. 29	304	204	61, 996	7. 15
Latimer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Le Flore	264, 544	23, 172	-----	287, 716	6. 51	138	172	23, 752	12. 11
McIntosh	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Muskogee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Okmulgee	317, 771	7, 810	-----	325, 581	5. 42	422	134	56, 684	5. 74
Pittsburg	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rogers	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sequoyah	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Tulsa	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Wagoner	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	812, 596	44, 798	830	858, 224	5. 64	517	203	104, 781	8. 19
Total Oklahoma	1, 834, 671	79, 080	1, 083	1, 914, 834	5. 88	1, 381	179	247, 213	7. 75

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
PENNSYLVANIA									
Allegheny	4,543,951	1,739,813	437,318	6,721,082	$5.35	4,451	188	838,478	8.02
Armstrong	1,923,052	247,477	2,144	2,172,673	3.99	1,010	170	171,580	12.66
Beaver	15,757	391,076	25	406,858	4.17	209	222	46,351	8.78
Bedford	33,268	33,213	------------	66,481	5.83	268	77	20,630	3.22
Blair	51,468	113,977	75	165,520	4.30	108	168	18,137	9.13
Bradford	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Butler	864,969	727,193	276	1,592,438	3.49	682	214	145,782	10.92
Cambria	8,042,888	466,070	628,262	9,137,220	5.95	9,542	164	1,569,444	5.82
Cameron	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Centre	424,203	473,127	499	897,829	3.54	421	192	80,674	11.13
Clarion	1,114,414	697,031	509	1,811,954	3.68	775	218	169,081	10.72
Clearfield	4,206,714	497,512	2,200	4,706,426	3.96	2,718	182	494,703	9.51
Clinton	269,108	323,907	70	593,085	3.84	167	223	37,214	15.94
Elk	271,824	154,417	59	426,300	3.60	228	177	40,392	10.55
Fayette	6,142,703	190,951	271,554	6,605,208	6.05	6,269	182	1,142,093	5.78
Fulton	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Greene	9,297,948	22,974	42,029	9,362,951	5.83	7,010	199	1,394,294	6.72
Huntingdon	70,623	92,747	------------	163,370	5.62	171	118	20,258	8.06
Indiana	4,394,383	263,859	446,922	5,105,164	4.72	3,143	194	608,453	8.39
Jefferson	1,199,736	166,163	1,092	1,366,991	3.91	919	186	171,291	7.98
Lawrence	------------	655,832	23	655,855	3.63	148	243	35,913	18.26
Lycoming	------------	31,656	------------	31,656	4.47	28	175	4,909	6.45
McKean	------------	92,710	------------	92,710	4.27	28	219	6,124	15.14
Mercer	256,974	379,990	180	637,144	4.22	231	250	57,771	11.03
Somerset	2,147,354	403,836	16,423	2,567,613	4.62	3,008	123	369,230	6.95
Tioga	------------	70,076	6	70,082	5.06	62	214	13,283	5.28
Venango	149,046	344,719	------------	493,765	3.68	136	259	35,281	14.00
Washington	11,710,519	957,684	311,798	12,980,001	6.04	8,906	167	1,484,365	8.74
Westmoreland	1,810,468	730,878	493,289	3,034,635	5.05	2,449	147	358,856	8.46
Other counties	102,568	42,522	------------	145,090	5.35	48	165	7,914	18.33
Total Pennsylvania	59,043,938	10,311,410	2,654,753	72,010,101	5.26	53,135	176	9,342,501	7.71

SOUTH DAKOTA (LIGNITE) [6]

TENNESSEE									
Anderson	329, 293	125, 828	2, 704	457, 825	$4. 62	571	115	65, 883	6. 95
Bledsoe		18, 707	75	18, 782	3. 67	21	187	3, 934	4. 77
Campbell	604, 954	148, 169	4, 073	757, 196	4. 93	844	175	147, 371	5. 14
Claiborne	328, 576	27, 500	971	357, 047	4. 21	271	169	45, 759	7. 80
Cumberland		101, 868		101, 868	3. 68	74	129	9, 566	10. 65
Fentress	27, 752	34, 720	20	62, 492	3. 61	85	108	9, 214	6. 78
Grundy	367, 793	120, 375		488, 168	3. 81	322	192	61, 756	7. 90
Hamilton	18, 200	67, 278		85, 478	3. 52	46	204	9, 374	9. 12
Marion	1, 215, 645	616, 345	1, 855	1, 833, 845	3. 71	1, 206	199	239, 502	7. 66
Morgan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Overton	11, 839	12, 526		24, 365	3. 44	32	135	4, 334	5. 62
Putnam	754, 642	25, 109	14, 248	793, 999	3. 96	282	234	65, 847	12. 06
Rhea		45, 380		45, 380	3. 96	34	149	5, 070	8. 95
Roane	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Scott	447, 593	89, 288	120	537, 001	3. 34	250	227	56, 661	9. 48
Sequatchie	130, 941	111, 045		241, 986	3. 35	187	186	34, 738	6. 97
Van Buren	13, 840	14, 788		28, 628	3. 66	33	120	3, 953	7. 24
White		14, 150		14, 150	3. 91	14	167	2, 335	6. 06
Other counties	328, 794	244, 901	6, 926	580, 621	3. 98	235	178	41, 749	13. 91
Total Tennessee	4, 579, 862	1, 817, 977	30, 992	6, 428, 831	3. 96	4, 507	179	807, 046	7. 79
TEXAS (LIGNITE) [6]									
UTAH									
Carbon	3, 460, 016	134, 189	26, 458	3, 620, 663	$6. 35	2, 384	172	409, 713	8. 84
Emery	1, 101, 642	191, 295	1, 169	1, 294, 106	4. 89	641	198	126, 624	10. 22
Garfield	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Iron		33, 701		33, 701	4. 78	23	236	5, 438	6. 20
Kane	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sevier	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Summit	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Uintah	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties		59, 312	170	59, 482	4. 83	30	228	6, 847	8. 69
Total Utah	4, 561, 658	418, 497	27, 797	5, 007, 952	5. 94	3, 078	178	548, 622	9. 18

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
VIRGINIA									
Buchanan	4,432,078	951,958	9,768	5,393,804	$4.18	4,229	181	764,261	7.06
Dickenson	2,903,701	184,931	21,679	3,110,311	4.37	1,910	183	349,561	8.90
Lee	479,186	106,937	5,048	591,171	5.30	630	169	106,739	5.54
Montgomery	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Russell	571,751	109,050	9,568	690,369	4.52	528	166	87,849	7.86
Scott	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Tazewell	2,574,298	105,293	17,222	2,696,813	5.14	2,210	173	383,243	7.04
Wise	3,316,576	483,328	79,411	3,879,315	4.25	2,624	183	479,526	8.09
Other counties	17,437	8,032	40	25,509	4.48	51	142	7,249	3.36
Total Virginia	14,295,027	1,949,529	142,736	16,387,292	4.45	12,182	179	2,178,428	7.52
WASHINGTON									
King	93,430	67,160	387	160,977	$7.47	157	205	32,194	5.00
Kittitas	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Lewis	----------	30,485	----------	30,485	5.37	28	143	3,992	7.64
Pierce	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Thurston	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Whatcom	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	383,449	32,299	11,999	427,747	7.28	540	168	90,777	4.71
Total Washington	476,879	129,944	12,386	619,209	7.23	725	175	126,963	4.88
WEST VIRGINIA									
Barbour	2,962,652	74,788	679	3,038,119	$3.94	1,126	188	211,833	14.34
Boone	5,752,679	46,312	11,140	5,810,131	4.54	3,040	205	623,403	9.32
Braxton	41,564	3,613	----------	45,177	4.15	74	135	9,965	4.53
Brooke	355,078	197,688	693,207	1,245,973	4.29	646	200	129,289	9.64
Clay	578,392	15,703	232	594,327	5.07	732	132	96,385	6.17
Fayette	5,308,915	219,075	212,116	5,740,106	5.39	4,669	192	894,742	6.42
Gilmer	35,952	35,697	----------	71,649	2.87	78	117	9,097	7.88

Grant	-	73,834	135	73,969	4.64	126	189	23,872	3.10
Greenbrier	1,012,836	90,954	8,174	1,111,964	4.50	1,037	149	154,723	7.19
Hancock	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Harrison	7,150,407	256,760	9,527	7,416,694	3.68	2,525	189	477,714	15.53
Kanawha	7,348,805	395,336	17,419	7,761,560	4.56	4,169	204	851,509	9.12
Lewis	573,256	51,284	-	624,540	3.12	159	192	30,490	20.48
Lincoln	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Logan	15,197,488	172,823	36,384	15,406,695	4.32	7,244	210	1,521,906	10.12
McDowell	15,639,445	232,891	250,214	16,122,550	5.75	11,281	204	2,306,031	6.99
Marion	8,316,720	127,960	213,305	8,657,985	4.79	4,197	183	766,825	11.29
Marshall	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mason	162,989	22,578	-	185,567	3.25	119	173	20,646	8.99
Mercer	1,296,819	63,091	11,537	1,371,447	5.19	1,559	145	226,682	6.05
Mineral	36,968	26,477	-	63,445	4.38	55	178	9,786	6.48
Mingo	6,694,583	84,190	19,357	6,798,130	4.41	3,524	195	688,442	9.87
Monongalia	6,576,951	234,079	4,171	6,815,201	4.05	2,761	193	532,473	12.80
Nicholas	4,142,216	100,228	34,287	4,276,731	4.52	2,571	196	503,974	8.49
Ohio	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pocahontas	352,527	18,129	-	370,656	4.25	236	221	52,080	7.12
Preston	1,388,848	646,391	8,274	2,043,513	3.36	1,574	181	285,144	7.17
Putnam	-	63,625	-	63,625	4.53	57	199	11,332	5.61
Raleigh	6,405,366	235,454	38,897	6,679,717	5.23	5,882	164	962,087	6.94
Randolph	1,031,780	22,904	6,147	1,060,831	5.14	924	179	165,489	6.41
Summers	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Taylor	338,555	117,336	-	455,891	3.02	218	184	40,027	11.39
Tucker	100,900	3,700	-	104,600	4.64	174	124	21,653	4.83
Upshur	1,023,020	101,237	1,968	1,126,225	3.69	666	190	126,743	8.89
Wayne	134,676	42,911	233	177,820	3.27	263	177	46,567	3.82
Webster	575,812	9,998	2,742	588,552	5.58	589	161	95,032	6.19
Wyoming	8,551,244	115,139	31,596	8,697,979	4.92	4,911	210	1,030,002	8.44
Other counties	1,299,333	95,050	289	1,394,672	4.15	825	198	163,411	8.53
Total West Virginia	110,386,776	3,997,235	1,612,030	115,996,041	4.67	68,011	192	13,089,354	8.86
WYOMING									
Campbell	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Carbon	199,807	26,416	6,977	233,200	$3.57	231	57	13,166	17.71
Converse	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fremont	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Hot Springs	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Johnson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Lincoln	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sheridan	396,223	38,358	-	434,581	3.15	116	206	23,934	18.16
Sweetwater	1,184,851	12,964	78,487	1,276,302	5.61	1,138	119	135,874	9.39
Other counties	816,106	44,853	26,388	887,347	2.46	206	197	40,621	21.84
Total Wyoming	2,596,987	122,591	111,852	2,831,430	4.08	1,691	126	213,595	13.26

For footnotes, see end of table.

TABLE 50.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous-coal and lignite mines in the United States, 1954, by States and counties—Continued

(Exclusive of mines producing less than 1,000 tons)

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days mines worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
LIGNITE									
California: Amador	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Montana:									
Custer	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Powder River	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Richland	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Sheridan	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
North Dakota:									
Adams	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Bowman	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Burke	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Burleigh	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Divide	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Dunn	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Grant	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Hettinger	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
McKenzie	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
McLean	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Mercer	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Morton	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Oliver	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Stark	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Ward	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Williams	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
South Dakota:									
Clay	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Corson	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Dewey	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Texas:									
Harrison	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Milam	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Total lignite [7]	2,239,839	1,756,850	246,117	4,242,806	$2.43	565	207	116,680	36.36

UNITED STATES

Total United States	338, 830, 414	44, 689, 375	8, 186, 511	391, 706, 300	$4. 52	227, 397	182	41, 361, 139	9. 47

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[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal f. o. b. mines. Includes a value for coal not sold but used by producers, such as mine fuel and coal coked, as estimated by producers at average prices that might have been received if such coal had been sold commercially.

[4] In certain counties the average tons per man per day is large due to auger mining, strip mining, or mechanical loading underground.

[5] Included in "Other counties"; not published to avoid disclosure of individual operations.

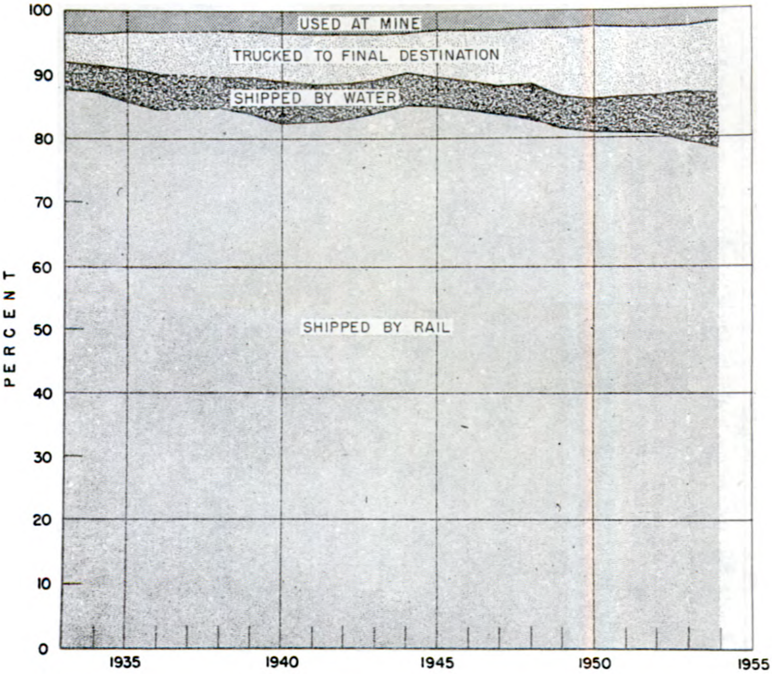
[6] Included in lignite total; not published to avoid disclosure of individual operations.

[7] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

TRANSPORTATION

Within recent years the methods of shipping bituminous coal and lignite from the mines have changed radically; shipments by rail have been declining, while shipments by water and by truck have been increasing. The percentages of the total shipped by each of the latter have more than doubled in the past 20 years. A detailed analysis of the historical trends in coal transportation is given in Minerals Yearbook, volume II, 1953 (pp. 127-133).

Detailed statistics on shipments of soft coal, by individual railroads and rivers, are shown in table 52. The data include coal shipped by rail, water, and trucks and used at mines, as reported by mine operators.



1947 data not available.

Figure 12.—Percentage of total production of bituminous coal and lignite 1933–54, by method of shipment from mines and used at mines.

TABLE 51.—Method of shipment of bituminous coal and lignite from mines, and used at mines, in the United States, 1933–54

Year	Method of shipment from mines			Used at mines [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
THOUSAND NET TONS					
1933	293, 258	13, 021	15, 463	11, 888	333, 630
1934	313, 304	15, 128	18, 739	12, 197	359, 368
1935	319, 742	18, 327	21, 960	12, 344	372, 373
1936	370, 763	24, 868	27, 929	15, 528	439, 088
1937	(2)	(2)	(2)	(2)	445, 531
1938	295, 336	16, 903	25, 592	10, 714	348, 545
1939	331, 190	22, 229	29, 534	11, 902	394, 855
1940	380, 388	29, 493	35, 540	15, 350	460, 771
1941	425, 184	30, 240	40, 056	18, 669	514, 149
1942	482, 814	34, 018	45, 154	20, 707	582, 693
1943	495, 863	30, 188	42, 433	21, 693	590, 177
1944	527, 136	31, 518	40, 123	20, 799	619, 576
1945	490, 472	27, 548	41, 477	18, 120	577, 617
1946	450, 615	24, 642	42, 731	15, 934	533, 922
1947	527, 282	29, 803	55, 859	17, 680	630, 624
1948	498, 194	26, 735	58, 260	16, 329	599, 518
1949	356, 602	21, 829	47, 786	11, 651	437, 868
1950	417, 225	27, 583	58, 286	13, 217	516, 311
1951	430, 387	29, 984	58, 132	15, 162	533, 665
1952	375, 911	27, 746	50, 231	12, 953	466, 841
1953	362, 133	35, 648	47, 102	12, 407	457, 290
1954	305, 918	32, 912	44, 689	8, 187	391, 706
PERCENTAGE OF TOTAL					
1933	87. 9	3. 9	4. 6	3. 6	100. 0
1934	87. 2	4. 2	5. 2	3. 4	100. 0
1935	85. 9	4. 9	5. 9	3. 3	100. 0
1936	84. 4	5. 7	6. 4	3. 5	100. 0
1937	(2)	(2)	(2)	(2)	100. 0
1938	84. 7	4. 9	7. 3	3. 1	100. 0
1939	83. 9	5. 6	7. 5	3. 0	100. 0
1940	82. 6	6. 4	7. 7	3. 3	100. 0
1941	82. 7	5. 9	7. 8	3. 6	100. 0
1942	82. 9	5. 8	7. 7	3. 6	100. 0
1943	84. 0	5. 1	7. 2	3. 7	100. 0
1944	85. 1	5. 1	6. 5	3. 3	100. 0
1945	84. 9	4. 8	7. 2	3. 1	100. 0
1946	84. 4	4. 6	8. 0	3. 0	100. 0
1947	83. 6	4. 7	8. 9	2. 8	100. 0
1948	83. 1	4. 5	9. 7	2. 7	100. 0
1949	81. 4	5. 0	10. 9	2. 7	100. 0
1950	80. 8	5. 3	11. 3	2. 6	100. 0
1951	80. 7	5. 6	10. 9	2. 8	100. 0
1952	80. 5	5. 9	10. 8	2. 8	100. 0
1953	79. 2	7. 8	10. 3	2. 7	100. 0
1954	78. 1	8. 4	11. 5	2. 0	100. 0

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyors or trams, made into beehive coke at mines, and all other uses at mines.

[2] Data not available.

TABLE 52.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1954, as reported by mine operators

Route	State	Net tons	
		By State	Total for route
RAILROAD			
Alabama Central	Alabama	63,386	63,386
Alaska	Alaska	652,059	652,059
Algers, Winslow & Western	Indiana	1,530,488	1,530,488
Atchison, Topeka & Santa Fe	Colorado	125,240	556,721
	Illinois	358,884	
	New Mexico	72,597	
Baltimore & Ohio	Illinois	181,905	30,060,409
	Indiana	92,101	
	Maryland	28,811	
	Ohio	3,576,869	
	Pennsylvania	5,034,625	
	West Virginia	21,146,098	
Bessemer & Lake Erie	Pennsylvania	1,582,571	1,582,571
Brimstone	Tennessee	131,839	131,839
Buffalo Creek & Gauley	West Virginia	523,318	523,318
Cambria & Indiana	Pennsylvania	2,497,661	2,497,661
Campbell's Creek	West Virginia	481,628	481,628
Carbon County	Utah	1,164,927	1,164,927
Central of Georgia	Alabama	22,719	22,719
Chesapeake & Ohio	Kentucky	8,757,248	42,758,896
	Ohio	174,068	
	Virginia	498,730	
	West Virginia	33,328,850	
Cheswick & Harmar	Pennsylvania	561,143	561,143
Chicago, Burlington & Quincy	Colorado	5,085	7,964,521
	Illinois	6,662,703	
	Iowa	195,178	
	Missouri	430,431	
	Wyoming	671,124	
Chicago & Eastern Illinois	Illinois	1,051,294	1,774,760
	Indiana	723,466	
Chicago & Illinois Midland	Illinois	3,327,010	3,327,010
Chicago, Indianapolis & Louisville	Indiana	264,972	264,972
Chicago, Milwaukee, St. Paul & Pacific	Indiana	2,136,578	2,454,090
	Montana (bituminous)	317,512	
Chicago & North Western	Illinois	869,027	869,027
Chicago, Rock Island & Pacific	Illinois	640,928	985,958
	Iowa	120,200	
	Missouri	149,818	
	Oklahoma	75,012	
Clinchfield	Virginia	3,565,282	3,565,282
Colorado & Southern	Colorado	7,059	7,059
Colorado & Wyoming	Colorado	707,180	707,180
Conemaugh & Black Lick	Pennsylvania	475,344	475,344
Denver & Rio Grande Western	Colorado	846,582	3,411,249
	New Mexico	5,129	
	Utah	2,559,538	
East Broad Top RR. & Coal Co.	Pennsylvania	35,118	35,118
Emory River RR.	Tennessee	163,226	163,226
Erie	Ohio	51,526	378,509
	Pennsylvania	326,983	
Fort Smith & Van Buren	Oklahoma	359,142	359,142
Galesburg & Great Eastern	Illinois	362,617	362,617
Great Northern	Montana (bituminous)	100	69,003
	Washington	68,903	
Gulf, Mobile & Ohio	Alabama	234,461	1,252,325
	Illinois	1,017,864	
Illinois Central	Alabama	55,280	25,665,714
	Illinois	10,135,965	
	Indiana	82,427	
	Kentucky	15,392,042	
Illinois Terminal	Illinois	584,341	584,341
Interstate	Kentucky	197,450	2,038,267
	Virginia	1,840,817	
Johnstown & Stony Creek	Pennsylvania	158,581	158,581
Kansas City Southern	Kansas	432,850	781,741
	Missouri	259,857	
	Oklahoma	89,034	
Kelley's Creek & Northwestern	West Virginia	949,145	949,145
Kentucky & Tennessee	Kentucky	268,531	268,531
Lake Erie, Franklin & Clarion	Pennsylvania	315,973	315,973
Litchfield & Madison	Illinois	307,989	307,989

TABLE 52.—**Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1954, as reported by mine operators—Continued**

Route	State	Net tons	
		By State	Total for route
RAILROAD—continued			
Louisville & Nashville	Alabama	1,550,017	24,154,682
	Illinois	350	
	Kentucky	22,028,344	
	Tennessee	442,182	
	Virginia	133,789	
Mary Lee	Alabama	409,285	409,285
Midland Valley	Arkansas	116,207	374,248
	Oklahoma	258,041	
Minneapolis & St. Louis	Illinois	1,067,715	1,069,662
	Iowa	1,947	
Missouri-Illinois	Illinois	530,614	530,614
Missouri-Kansas-Texas	Kansas	390,492	1,281,466
	Missouri	550,870	
	Oklahoma	340,104	
Missouri Pacific	Arkansas	245,529	3,106,077
	Illinois	2,745,434	
	Kansas	111,539	
	Missouri	3,575	
Monongahela	Pennsylvania	907,170	7,926,522
	West Virginia	7,019,352	
Montour	Pennsylvania	1,796,630	1,796,630
Nashville, Chattanooga & St. Louis	Tennessee	948,350	948,350
New York Central (includes coal shipped over Kanawha & Michigan, Kelley's Creek, Toledo & Ohio Central, and Zanesville & Western)	Illinois	5,238,071	16,403,796
	Indiana	2,445,618	
	Ohio	2,778,429	
	Pennsylvania	3,983,091	
	West Virginia	1,958,587	
New York, Chicago & St. Louis	Ohio	7,316,434	7,316,434
Nicholas, Fayette & Greenbrier	West Virginia	1,163,053	1,163,053
Norfolk & Western	Kentucky	3,552,357	34,226,118
	Ohio	10,000	
	Virginia	7,798,423	
	West Virginia	22,865,338	
Northeast Oklahoma	Kansas	1,851	1,851
Northern Pacific	Montana (bituminous)	1,088,829	1,415,526
	Washington	326,697	
Oklahoma City-Ada-Atoka	Oklahoma	19,093	19,093
Pacific Coast	Washington	81,279	81,279
Pennsylvania (includes Pittsburgh, Cincinnati, Chicago, & St. Louis)	Illinois	7,505	24,754,073
	Indiana	2,853,022	
	Ohio	4,684,223	
	Pennsylvania	17,087,710	
	West Virginia	121,613	
Pittsburgh & Lake Erie	Pennsylvania	766,397	766,397
Pittsburg & Shawmut	Pennsylvania	1,431,439	1,431,439
Pittsburgh, Chartiers & Youghiogheny	Pennsylvania	1,897	1,897
Pittsburgh & West Virginia	Ohio	693,635	839,845
	Pennsylvania	53,298	
	West Virginia	92,912	
Preston	West Virginia	38,231	38,231
St. Louis & O'Fallon	Illinois	3,718	3,718
St. Louis-San Francisco	Alabama	762,522	2,281,630
	Arkansas	66,328	
	Kansas	212,616	
	Missouri	545,919	
	Oklahoma	694,245	
Southern	Alabama	288,342	2,445,092
	Indiana	618,571	
	Kentucky	242,136	
	Tennessee	852,876	
	Virginia	443,167	
Southern Iowa	Iowa	63,676	63,676
Tennessee	Tennessee	467,783	467,783
Tennessee Central	Tennessee	776,737	776,737
Tennessee Coal, Iron & Railroad Co.	Alabama	2,940,538	2,940,538
Thomas & Sayreton	Alabama	234,181	234,181
Toledo, Peoria, & Western	Illinois	235,793	235,793
Union	Pennsylvania	9,250	9,250
Union Pacific	Colorado	322,924	2,248,787
	Wyoming	1,925,863	
Unity	Pennsylvania	557,189	557,189

TABLE 52.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1954, as reported by mine operators—Continued

Route	State	Net tons: By State	Net tons: Total for route
RAILROAD—continued			
Utah	Utah	837,193	837,193
Virginian	Virginia	14,819	11,903,218
	West Virginia	11,888,399	
Wabash	Iowa	263,688	429,872
	Missouri	166,184	
West Virginia Northern	West Virginia	458,966	458,966
Western Allegheny	Pennsylvania	204,898	204,898
Western Maryland	Maryland	82,314	4,305,069
	Pennsylvania	378,055	
	West Virginia	3,844,700	
Winifrede	West Virginia	208,895	208,895
Woodward Iron Co.	Alabama	917,663	917,663
Youngstown & Southern	Ohio	7,038	7,038
Lignite (all railroads)		2,239,839	2,239,839
Total railroad shipments		305,918,032	305,918,032
WATERWAY			
Allegheny River	Pennsylvania	1,305,807	1,305,807
Black Warrior River	Alabama	252,706	252,706
Green River	Kentucky	129,277	129,277
Illinois River	Illinois	1,195,791	1,195,791
Inland Water Way	Alabama	460,384	460,384
Kanawha River	West Virginia	2,223,381	2,223,381
Kentucky River	Kentucky	28,000	28,000
Monongahela River	Pennsylvania	19,571,258	21,040,556
	West Virginia	1,469,298	
Ohio River	Illinois	103,464	5,477,761
	Indiana	244,592	
	Kentucky	1,954,273	
	Ohio	2,570,420	
	West Virginia	605,012	
Tennessee River	Tennessee	796,869	796,869
Youghiogheny River	Pennsylvania	1,850	1,850
Total waterway shipments		32,912,382	32,912,382
Total loaded at mines for shipment by railroads and waterways		338,830,414	338,830,414
Shipped by truck from mine to final destination		44,689,375	44,689,375
Used at mine [1]		8,186,511	8,186,511
Total production, 1954		391,706,300	391,706,300

[1] Includes coal used by mine employees, taken by locomotive tenders at tipple, used at mine for power and heat, transported from mine to point of use by conveyor or tram, made into beehive coke at mine, and all other uses at mine.

CONSUMPTION

The statistics on consumption of bituminous coal and lignite, by major consumer classes, for 1933–54, as shown in table 53, are based upon complete coverage of all consumers in each class with the exception of "Other industrials" and "Retail deliveries." The figures for each of these 2 categories are based upon a monthly sample approximating 35-percent coverage. In each instance a benchmark was established in 1943, based upon 95-percent coverage. Since 1943 data for each month have been determined by matching identicals for the last 2 months, calculating the percentage change of these identicals for the last month from the month previous, and applying this percentage change to the published figure for the month previous. The results obtained by this procedure have been reasonably reliable over a period of years. As indicated in footnote 7 of table 53, the total of classes shown approximates total consumption and is a much more reliable figure than "calculated" consumption based on production, imports, exports, and changes in stocks, because certain significant items of stocks are not included in year-end stocks.

There have been a number of major changes in the consumption of bituminous coal and lignite during the past 20 years. From a depression level of slightly over 315 million tons in 1933, consumption expanded to a war level of almost 600 million tons in 1943. Since 1943 consumption of soft coal has been generally downward, reaching 363 million tons in 1954. An analysis of the different consumer classes reveals wide variations in trends. Since the close of World War II consumption by electric power utilities has doubled, coke plants and cement mills have remained steady consumers, and railroads in 1954 used only 14 percent of their wartime level. Diesel-electric locomotives have rapidly replaced coal-burning steam locomotives. Present experiments on coal-gas turbine locomotives are underway in an effort to recover the lost railroad market for coal. The other consumer classes all declined in coal consumed since World War II, including retail deliveries.

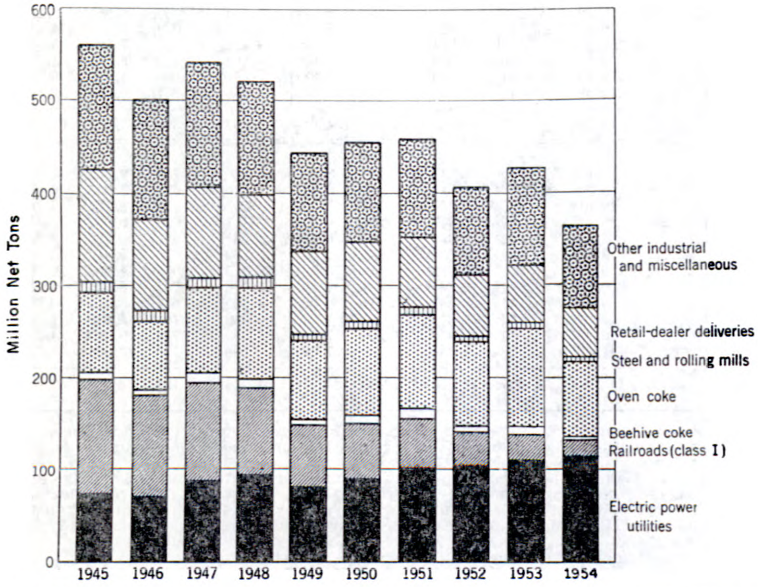


FIGURE 13.—Consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States, 1945–54.

TABLE 53.—Consumption of bituminous coal and lignite, by consumer classes, with retail deliveries in the United States, 1933–54, in thousand net tons

Year and month	Electric power utilities[1]	Bunker foreign trade[2]	Railroads[3] (class I)	Coke plants		Steel and rolling mills	Cement mills[4]	Other industrials[5]	Retail deliveries[6]	Total of classes shown[7]
				Beehive	Ovens					
1933	27,088	1,316	72,548	1,408	38,681	10,009	2,832	83,321	80,482	317,685
1934	29,707	1,321	76,037	1,635	44,343	10,898	3,500	89,448	86,925	343,814
1935	30,936	1,576	77,109	1,469	49,046	11,747	3,516	96,937	83,990	356,326
1936	38,104	1,622	86,391	2,698	63,244	13,471	4,771	113,792	84,200	408,293
1937	41,045	1,832	88,080	4,927	69,575	12,853	5,247	127,142	80,076	430,777
1938	36,440	1,352	73,921	1,360	45,266	8,412	4,483	96,527	68,520	336,281
1939	42,304	1,477	79,072	2,298	61,216	9,808	5,274	103,079	71,570	376,098
1940	49,126	1,426	85,130	4,803	76,583	10,040	5,633	110,469	87,700	430,910
1941	59,888	1,643	97,384	10,529	82,609	10,902	6,832	124,868	97,460	492,115
1942	63,472	1,585	115,410	12,876	87,974	10,434	7,570	135,979	104,750	540,050
1943	74,036	1,647	130,283	12,441	90,019	11,238	5,851	145,518	122,764	593,797
1944	76,656	1,559	132,049	10,858	94,438	10,734	3,789	134,610	124,906	589,599
1945	71,603	1,785	125,120	8,135	87,214	10,084	4,215	129,606	121,805	559,567
1946	68,743	1,381	110,166	7,167	76,121	8,603	7,009	120,610	100,586	500,386
1947	86,009	1,689	109,296	10,475	94,325	10,048	7,938	126,948	99,163	545,891
1948	95,620	1,057	94,838	10,322	96,984	10,046	8,554	112,741	89,747	519,909
1949	80,610	874	68,123	5,354	85,882	7,451	7,988	98,957	90,299	445,538
1950	88,262	717	60,969	9,088	94,757	7,698	7,943	98,164	86,604	454,202
1951	101,898	890	54,005	11,418	102,030	7,973	8,525	105,634	76,531	468,904
1952	103,309	723	37,962	6,912	90,702	6,820	8,073	95,863	68,393	418,757
1953:										
January	10,182	11	2,833	760	8,960	679	764	9,300	7,996	41,485
February	8,863	9	2,448	733	8,102	617	687	8,705	6,893	37,057
March	9,104	9	2,560	867	8,994	625	709	9,027	5,756	37,651
April	8,616	73	2,413	820	8,620	559	664	8,422	4,317	34,504
May	8,298	79	2,334	866	9,031	474	692	7,597	2,724	32,095
June	8,764	73	2,168	791	8,763	454	668	7,164	2,841	31,686
July	9,286	73	2,191	650	9,074	449	686	6,985	3,202	32,596
August	9,395	73	2,227	661	8,985	424	682	7,160	4,019	33,626
September	9,379	66	2,134	587	8,591	421	668	7,203	5,325	34,374
October	9,918	66	2,239	567	8,802	469	702	8,262	5,708	36,733
November	9,893	54	2,096	478	8,387	481	686	8,427	5,371	35,873
December	10,585	19	2,092	446	8,339	555	754	9,185	7,143	39,118
Total	112,283	605	27,735	8,226	104,648	6,207	8,362	97,437	61,295	426,798
1954:										
January	10,620	5	1,939	258	8,049	566	735	9,268	8,336	39,776
February	8,798	4	1,610	104	6,904	476	624	8,045	6,402	32,967
March	9,614	5	1,601	58	7,302	532	679	8,189	6,165	34,145
April	8,438	29	1,347	61	6,661	411	628	6,952	3,471	27,998
May	8,435	52	1,356	54	6,814	381	641	6,160	2,646	26,539
June	9,029	62	1,254	55	6,594	339	576	5,416	2,279	25,604
July	9,133	55	1,278	56	6,581	315	675	4,809	2,101	25,003
August	9,568	47	1,384	73	6,427	306	693	5,155	2,868	26,521
September	9,456	47	1,233	68	6,395	320	674	5,356	3,622	27,171
October	10,076	54	1,375	55	7,245	360	740	5,940	4,397	30,242
November	10,435	47	1,449	66	7,444	432	719	6,469	4,542	31,603
December	11,633	20	1,544	72	7,995	506	740	7,194	5,787	35,491
Total	115,235	427	17,370	980	84,411	4,944	8,124	78,953	52,616	363,060

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[1] Federal Power Commission. Represents latest available revised figures for bituminous coal and lignite consumed by public-utility power plants in power generation, including a small quantity of coke.

[2] Bureau of Census, U. S. Department of Commerce.

[3] Association of American Railroads. Represents consumption of bituminous coal and lignite by class I railways for all uses, including locomotive, powerhouse, shop, and station fuel. The Interstate Commerce Commission reports that in 1954 consumption for all uses by class I line-haul railways, plus purchases for class II and class III railways, plus purchases by all switching terminal companies was 17,337,755 tons of bituminous coal and lignite.

[4] Includes a small amount of anthracite.

[5] Estimates based upon reports collected from a selected list of representative manufacturing plants.

[6] Estimates based upon reports collected from a selected list of representative retailers. Includes some coal shipped by trucks from mines to final destination.

[7] The total of classes shown approximates total consumption. It is not possible to calculate consumption closely from production, imports, exports, and changes in stocks because certain significant items of stocks are not included in year-end stocks. These items are: Stocks on Lake and Tidewater docks, stocks at other intermediate storage piles between mines and consumers, and coal in transit.

TABLE 54.—Fuel economy in consumption of coal at electric-utility power plants in the United States, 1919–54

Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100
1919	3.20	100.0	1931	1.52	47.5	1943	1.30	40.6
1920	3.00	93.8	1932	1.49	46.6	1944	1.29	40.3
1921	2.70	84.4	1933	1.46	45.6	1945	1.30	40.6
1922	2.50	78.1	1934	1.45	45.3	1946	1.29	40.3
1923	2.40	75.0	1935	1.44	45.0	1947	1.31	40.9
1924	2.20	68.8	1936	1.44	45.0	1948	1.30	40.6
1925	2.00	62.5	1937	1.44	45.0	1949	1.24	38.8
1926	1.90	59.4	1938	1.40	43.8	1950	1.19	37.2
1927	1.82	56.9	1939	1.38	43.1	1951	1.14	35.6
1928	1.73	54.1	1940	1.34	41.9	1952	1.10	34.4
1929	1.66	51.9	1941	1.34	41.9	1953	1.06	33.1
1930	1.60	50.0	1942	1.30	40.6	1954	.99	30.9

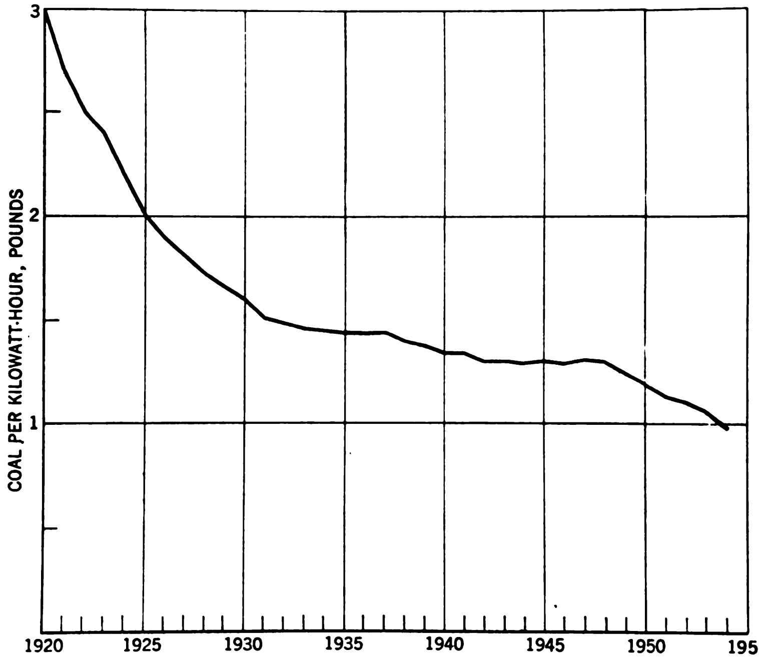

FIGURE 14.—Trend in fuel economy at electric-utility power plants in the United States, 1920–54.

RELATIVE RATE OF GROWTH OF MINERAL FUELS & WATERPOWER

In the past year industry representatives and other Government agencies have requested the Bureau of Mines to compile data on the calculated consumption of mineral energy for the continental United States and also to revise the existing energy tables published by the Bureau of Mines.

After a complete analysis of these data, it was deemed advisable to include certain items previously omitted, such as net imports of hydroelectric and net imports or net exports of the balance of petroleum products. The calculated consumption of energy without these data would be incomplete. In this publication these revisions have been made and these data will supersede energy tables released in the past.

The principal changes in the production data were in the marketed production of natural gas. (See table 55.) Beginning with 1947, statistics on the marketed production of natural gas were reported on a new basis, which included the net volume stored and lost in transmission. The marketed production of natural gas was revised from 1929 through 1946 to include this estimated amount stored and lost in transmission. The revised data were published in the Minerals Yearbook in 1949. For the figures on marketed production of natural gas to be comparable for all years, further estimates on the same basis were made to 1920.

Natural-gas liquids extracted from gas used for repressuring and waste are included in the marketed production; however, no account of these liquids was considered in using 1,075 B. t. u. per cubic foot, as this factor is used for natural gas at the wellhead. Comprehensive data on compiling these energy tables were published in Weekly Coal Report 2020. The revision in the calculated consumption of natural gas in these tables results in adding to the calculated demand (loss in transmission) shown in table 8 of this report. This revision was made so that the consumption data are more reasonably correct, as gas lost in transmission and unaccounted for is an essential item to get the gas to the point of consumption.

The data on production and calculated consumption are expressed in British thermal units, because some common denominator is necessary for such unlike quantities as tons of coal, barrels of oil, and cubic feet of gas. Tables 56 and 58 summarize the equivalent of each of the fuels in trillion British thermal units. Waterpower is represented by the equivalent fuel required to perform the same work.

In converting waterpower to its equivalent of fuel required to perform the same work, the *prevailing* or average performance of all fuel-burning central electric stations for each year in question has been used. This average has declined from about 6.85 pounds of coal per kilowatt-hour in 1900 to 0.99 in 1954, which shows the influence of improved fuel efficiency.

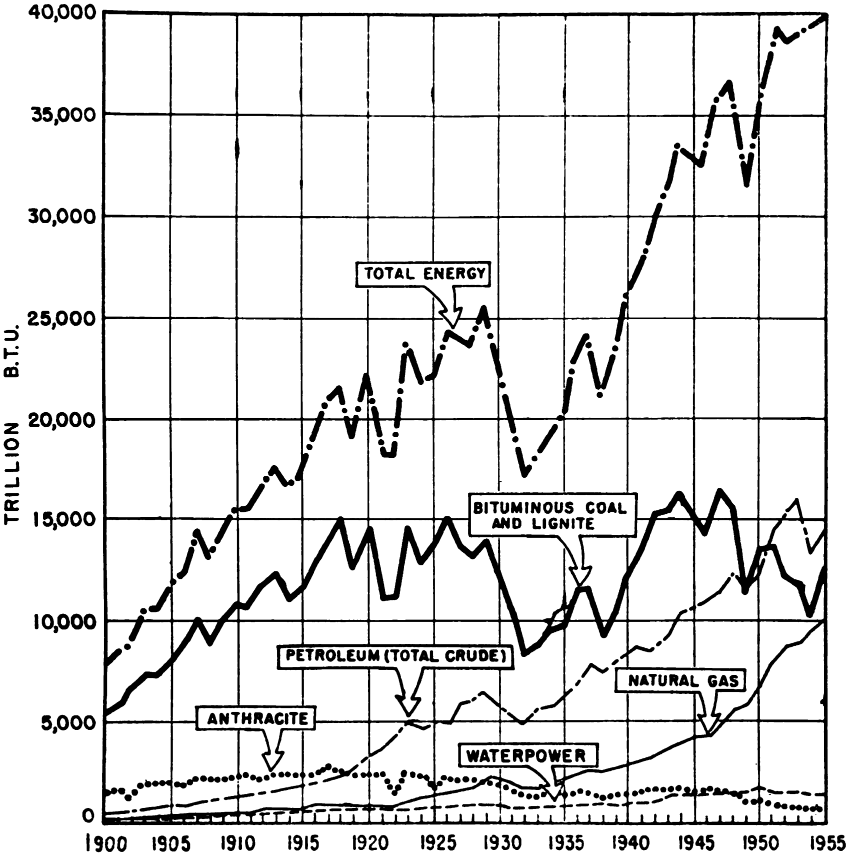

FIGURE 15.—Production of mineral-energy fuels and energy from waterpower in continental United States, 1900–55.

The subject of interfuel competition is exceedingly complex, and an elaborate analysis and accumulation of data not now available would be required to determine even approximately how much of any one fuel actually has been displaced either by other fuels or by waterpower. The present tables do not permit determination of such displacement, as their purpose is rather to measure the long-time trends in the total United States production and calculated consumption of energy in the continental United States.

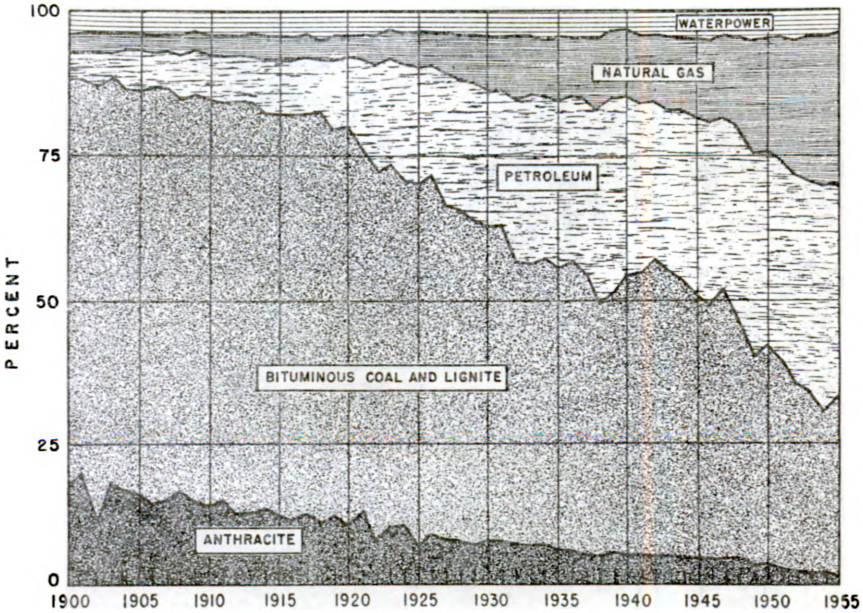

FIGURE 16.—Percentage of total production of British thermal units equivalent of mineral-energy fuels and energy from waterpower in continental United States, 1900–55.

TABLE 55.—Production of mineral-energy fuels and energy from waterpower in the continental United States

Year	Bituminous coal and lignite [1]			Anthracite [1]	Crude petroleum [2]	Natural gas [3]	Electricity from waterpower [4]
	Continental U. S.	Alaska	Total U. S.				
1900	212, 315	1	212, 316	57, 368	63, 621	128, 000	2, 786
1901	225, 827	1	225, 828	67, 472	69, 389	180, 000	3, 030
1902	260, 215	2	260, 217	41, 374	88, 767	206, 000	3, 420
1903	282, 748	1	282, 749	74, 607	100, 461	239, 000	3, 927
1904	278, 658	2	278, 660	73, 157	117, 081	257, 000	4, 481
1905	315, 059	4	315, 063	77, 660	134, 717	320, 000	5, 054
1906	342, 869	6	342, 875	71, 282	126, 494	388, 843	5, 613
1907	394, 749	10	394, 759	85, 604	166, 095	406, 622	6, 200
1908	332, 571	3	332, 574	83, 269	178, 527	402, 141	6, 974
1909	379, 741	3	379, 744	81, 070	183, 171	480, 706	7, 848
1910	417, 110	1	417, 111	84, 485	209, 557	509, 155	8, 626
1911	405, 906	1	405, 907	90, 464	220, 449	512, 993	9, 458
1912	450, 105	----------	450, 105	84, 362	222, 935	562, 203	10, 266
1913	478, 433	2	478, 435	91, 525	248, 446	581, 898	11, 229
1914	422, 704	----------	422, 704	90, 822	265, 763	591, 867	12, 229
1915	442, 623	1	442, 624	88, 995	281, 104	628, 579	13, 238
1916	502, 507	13	502, 520	87, 578	300, 767	753, 170	14, 321
1917	551, 737	54	551, 791	99, 612	335, 316	795, 110	15, 399
1918	579, 310	76	579, 386	98, 826	355, 928	721, 001	15, 974
1919	465, 799	61	465, 860	88, 092	378, 367	745, 916	17, 021
1920	568, 606	61	568, 667	89, 598	442, 929	812, 338	18, 779
1921	415, 845	77	415, 922	90, 473	472, 183	673, 770	17, 529
1922	422, 189	79	422, 268	54, 683	557, 531	776, 043	19, 634
1923	564, 445	120	564, 565	93, 339	732, 407	1, 024, 800	21, 788
1924	483, 587	100	483, 687	87, 927	713, 940	1, 161, 726	22, 484
1925	519, 970	83	520, 053	61, 817	763, 743	1, 209, 609	25, 496
1926	573, 280	87	573, 367	84, 437	770, 874	1, 336, 259	29, 249
1927	517, 659	104	517, 763	80, 096	901, 129	1, 471, 012	32, 548
1928	500, 619	126	500, 745	75, 348	901, 474	1, 595, 895	37, 683
1929	534, 888	101	534, 989	73, 828	1, 007, 323	1, 952, 166	37, 524
1930	467, 406	120	467, 526	69, 385	898, 011	1, 978, 911	35, 878
1931	381, 983	106	382, 089	59, 646	851, 081	1, 721, 902	33, 548
1932	309, 607	103	309, 710	49, 855	785, 159	1, 593, 798	36, 529
1933	333, 535	96	333, 631	49, 541	905, 656	1, 596, 673	37, 175
1934	359, 260	108	359, 368	57, 168	908, 065	1, 815, 796	36, 747
1935	372, 254	119	372, 373	52, 159	996, 596	1, 968, 963	42, 727
1936	438, 951	137	439, 088	54, 580	1, 099, 687	2, 225, 477	43, 045
1937	445, 399	132	445, 531	51, 856	1, 279, 160	2, 473, 483	46, 173
1938	348, 390	155	348, 545	46, 099	1, 214, 355	2, 358, 201	47, 219
1939	394, 707	148	394, 855	51, 487	1, 264, 962	2, 538, 383	46, 355
1940	460, 598	174	460, 772	51, 485	1, 353, 214	2, 733, 819	50, 131
1941	513, 910	239	514, 149	56, 368	1, 402, 228	2, 893, 525	53, 207
1942	582, 432	261	582, 693	60, 328	1, 386, 645	3, 145, 694	66, 706
1943	589, 888	289	590, 177	60, 644	1, 505, 613	3, 515, 531	79, 078
1944	619, 228	348	619, 576	63, 701	1, 677, 904	3, 815, 024	78, 905
1945	577, 319	298	577, 617	54, 934	1, 713, 655	4, 042, 002	84, 747
1946	533, 555	367	533, 922	60, 507	1, 733, 939	4, 152, 762	83, 150
1947	630, 263	361	630, 624	57, 190	1, 856, 987	4, 582, 173	83, 066
1948	599, 110	408	599, 518	57, 140	2, 020, 185	5, 148, 020	86, 992
1949	437, 434	434	437, 868	42, 702	1, 841, 940	5, 419, 736	94, 773
1950	515, 899	412	516, 311	44, 077	1, 973, 574	6, 282, 060	100, 885
1951	533, 171	494	533, 665	42, 670	2, 247, 711	7, 457, 359	104, 376
1952	466, 155	686	466, 841	40, 583	2, 289, 836	8, 013, 457	109, 708
1953	456, 429	861	457, 290	30, 949	2, 357, 082	8, 396, 916	109, 617
1954	391, 039	667	391, 706	29, 100	2, 314, 988	8, 742, 546	111, 640

[1] Thousand net tons.

[2] Thousand barrels. Crude petroleum and commingled condensate.

[3] Million cubic feet. Total production minus repressuring, vent and waste.

[4] Million kilowatt-hours. The years 1920 to 1942, inclusive, represent the fuel equivalent of waterpower converted to kilowatt-hours at the prevailing rate of pounds of coal per kilowatt-hour at central electric stations. The years since 1942 represent production of electricity by waterpower at electric utility and industrial plants, as published by the Federal Power Commission.

TABLE 56.—Production of mineral-energy fuels and energy from waterpower in trillion British thermal units and percentage contributed by each in continental United States [1]

Year	Bituminous coal and lignite			Anthracite	Crude petroleum	Natural gas wet	Water-power	Grand total	Percentage					
	Continental United States	Alaska	Total United States						Bituminous coal and lignite	Anthracite	Crude petroleum	Natural gas wet	Water-power	Total
1900	5,563	----------	5,563	1,457	369	254	250	7,893	70.5	18.4	4.7	3.2	3.2	100.0
1901	5.917	----------	5.917	1,714	402	283	264	8,580	68.9	20.0	4.7	3.3	3.1	100.0
1902	6,818	----------	6,818	1,051	515	301	289	8.974	76.0	11.7	5.7	3.4	3.2	100.0
1903	7,408	----------	7,408	1,895	583	319	321	10,526	70.4	18.0	5.5	3.0	3.1	100.0
1904	7,301	----------	7,301	1,858	679	333	354	10,525	69.4	17.6	6.4	3.2	3.4	100.0
1905	8,255	----------	8,255	1,973	781	377	386	11,772	70.1	16.8	6.6	3.2	3.3	100.0
1906	8,983	----------	8,983	1,811	734	418	414	12,360	72.7	14.7	5.9	3.4	3.3	100.0
1907	10,343	----------	10,343	2,174	963	437	441	14.358	72.0	15.1	6.7	3.1	3.1	100.0
1908	8.713	----------	8.713	2,115	1,035	432	476	12,771	68.2	16.6	8.1	3.4	3.7	100.0
1909	9,949	----------	9,949	2,059	1.062	517	513	14,100	70.6	14.6	7.5	3.7	3.6	100.0
1910	10,928	----------	10,928	2,146	1,215	547	539	15,375	71.1	14.0	7.9	3.5	3.5	100.0
1911	10,635	----------	10,635	2.298	1,279	551	565	15,328	69.4	15.0	8.3	3.6	3.7	100.0
1912	11,793	----------	11,793	2,143	1,293	604	585	16,418	71.8	13.0	7.9	3.7	3.6	100.0
1913	12.535	----------	12.535	2,325	1,441	626	609	17,536	71.5	13.2	8.2	3.6	3.5	100.0
1914	11,075	----------	11,075	2.307	1.541	636	636	16,195	68.4	14.3	9.5	3.9	3.9	100.0
1915	11,597	----------	11,597	2,260	1,630	676	659	16,822	69.0	13.4	9.7	4.0	3.9	100.0
1916	13,166	----------	13,166	2,224	1,744	810	681	18,625	70.7	11.9	9.4	4.3	3.7	100.0
1917	14,456	1	14.457	2,530	1,945	855	700	20,487	70.6	12.3	9.5	4.2	3.4	100.0
1918	15,178	2	15,180	2,510	2,064	775	701	21,230	71.5	11.8	9.7	3.7	3.3	100.0
1919	12,204	2	12,206	2,238	2,195	802	718	18,159	67.2	12.3	12.1	4.4	4.0	100.0
1920	14,897	2	14.899	2,276	2,569	883	738	21,365	69.7	10.7	12.0	4.1	3.5	100.0
1921	10,895	2	10,897	2,298	2,739	732	620	17,286	63.0	13.3	15.9	4.2	3.6	100.0
1922	11,061	2	11,063	1,389	3,234	843	643	17,172	64.5	8.1	18.8	4.9	3.7	100.0
1923	14,788	4	14,792	2,371	4,248	1,113	685	23,209	63.7	10.2	18.3	4.8	3.0	100.0
1924	12,670	2	12,672	2,233	4.141	1,263	648	20,957	60.5	10.6	19.8	6.0	3.1	100.0
1925	13.623	2	13,625	1,570	4,430	1.314	668	21,607	63.1	7.2	20.5	6.1	3.1	100.0
1926	15.019	1	15,020	2.145	4.471	1 452	728	23,816	63.1	9.0	18.8	6.1	3.0	100.0
1927	13,563	2	13,565	2,034	5,227	1,598	776	23,200	58.5	8.8	22.5	6.9	3.3	100.0
1928	13.116	4	13,120	1.914	5,229	1,734	854	22,851	57.4	8.4	22.9	7.6	3.7	100.0
1929	14,014	3	14.017	1,875	5.842	2,118	816	24,668	56.8	7.6	23.7	8.6	3.3	100.0

1930	12,246	3	12,249	1,762	5.208	2,148	752	22,119	55.4	8.0	23.5	9.7	3.4	100.0
1931	10,008	3	10,011	1,515	4,936	1,869	668	18,999	52.7	8.0	26.0	9.8	3.5	100.0
1932	8,112	2	8.114	1,266	4.554	1,729	713	16,376	49.5	7.7	27.8	10.6	4.4	100.0
1933	8,739	2	8.741	1,258	5,253	1.733	711	17,696	49.4	7.1	29.7	9.8	4.0	100.0
1934	9,413	2	9,415	1,452	5,267	1,970	698	18,802	50.1	7.7	28.0	10.5	3.7	100.0
1935	9,753	3	9,756	1,325	5,780	2,136	806	19,803	49.2	6.7	29.2	10.8	4.1	100.0
1936	11,501	3	11,504	1,386	6,378	2,411	812	22,491	51.2	6.1	28.4	10.7	3.6	100.0
1937	11,669	4	11,673	1,317	7,419	2,684	871	23,964	48.7	5.5	31.0	11.2	3.6	100.0
1938	9,128	4	9,132	1,171	7,043	2,565	866	20,777	44.0	5.6	33.9	12.3	4.2	100.0
1939	10,341	4	10,345	1,308	7,337	2,763	838	22,591	45.8	5.8	32.5	12.2	3.7	100.0
1940	12,068	4	12,072	1,308	7,849	2,979	880	25,088	48.1	5.2	31.3	11.9	3.5	100.0
1941	13.464	7	13,471	1,432	8,133	3,162	934	27,132	49.6	5.3	30.0	11.7	3.4	100.0
1942	15,260	7	15,267	1,532	8,043	3,436	1,136	29.414	51.9	5.2	27.3	11.7	3.9	100.0
1943	15,455	8	15.463	1,540	8,733	3,839	1,304	30,879	50.1	5.0	28.3	12.4	4.2	100.0
1944	16,224	9	16,233	1,618	9,732	4.176	1,344	33,103	49.0	4.9	29.4	12.6	4.1	100.0
1945	15,126	8	15,134	1,395	9,939	4,423	1,442	32,333	46.8	4.3	30.7	13.7	4.5	100.0
1946	13,979	10	13,989	1,537	10,057	4,550	1,406	31,539	44.3	4.9	31.9	14.4	4.5	100.0
1947	16,513	9	16,522	1,453	10,771	5,012	1,426	35,184	47.0	4.1	30.6	14.2	4.1	100.0
1948	15.697	10	15,707	1,451	11,717	5,615	1,481	35,971	43.7	4.0	32.6	15.6	4.1	100.0
1949	11,461	11	11,472	1,085	10,683	5,911	1,539	30,690	37.4	3.5	34.8	19.3	5.0	100.0
1950	13,517	10	13,527	1,120	11,449	6,841	1,573	34,510	39.2	3.2	33.2	19.8	4.6	100.0
1951	13,969	13	13,982	1,084	13,037	8,106	1,559	37,768	37.0	2.9	34.5	21.5	4.1	100.0
1952	12,213	18	12,231	1,031	13,282	8,705	1,581	36,830	33.2	2.8	36.1	23.6	4.3	100.0
1953	11,958	23	11,981	786	13,671	9,116	1.522	37,076	32.3	2.1	36.9	24.6	4.1	100.0
1954	10,245	17	10,262	739	13,427	9,488	1,449	35,365	29.0	2.1	38.0	26.8	4.1	100.0

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[1] The unit heat values employed are: Anthracite, 12,700 B. t. u. per pound; bituminous coal and lignite, 13,100 B. t. u. per pound; petroleum, 5,800 B. t. u. per barrel; natural gas, total production×1,075 B. t. u. minus repressuring vent and waste gas×1,035. Waterpower includes installations owned by manufacturing plants and mines, as well as Government and privately owned public utilities. The fuel equivalent of waterpower is calculated from the kilowatt-hours of power produced wherever available, as it is true of all public-utility plants since 1919. Otherwise, the fuel equivalent is calculated from the reported horsepower of installed water wheels, assuming a capacity factor of 20 percent for factories and mines and 40 percent for public utilities.

TABLE 57.—Calculated consumption of energy fuels and energy from waterpower in continental United States [1]

Year	Bituminous coal and lignite [2]	Anthracite [2]	Crude petroleum [3]	Petroleum products net: E, exported; I, imported [3]	Natural gas dry [4] [5]	Natural gas liquids [6]	Electricity from waterpower [7]		
							Production	Net imports	Total
1920	508,595	85,786	521,876	E 67,634	799,248	385	18,779	940	19,719
1921	391,849	81,950	520,044	E 58,597	658,470	450	17,529	1,009	18,538
1922	426,915	56,799	584,547	E 54,874	758,839	506	19,634	965	20,599
1923	518,993	86,914	715,428	E 66,809	997,056	816	21,788	1,331	23,119
1924	484,004	80,717	728,908	E 82,099	1,129,970	934	22,484	1,290	23,774
1925	499,193	64,061	800,217	E 84,121	1,171,291	1,127	25,496	1,257	26,753
1926	532,581	77,221	840,697	E 95,605	1,289,916	1,359	29,249	1,493	30,742
1927	499,801	74,672	866,784	E 112,452	1,415,218	1,628	32,548	1,619	34,167
1928	498,828	73,650	943,807	E 124,209	1,534,219	1,819	37,683	1,573	39,256
1929	519,555	71,457	1,016,188	E 106,942	1,875,968	2,236	37,524	1,423	38,947
1930	454,990	67,628	1,060,067	E 89,305	1,901,994	2,212	35,878	1,592	37,470
1931	371,869	58,408	914,484	E 60,022	1,657,427	1,820	33,548	1,209	34,757
1932	306,917	50,500	832,767	E 44,451	1,540,327	1,440	36,529	644	37,173
1933	317,685	49,600	886,617	E 54,071	1,546,318	1,307	37,175	967	38,142
1934	343,814	55,500	885,527	E 56,801	1,757,873	1,463	36,747	1,234	37,981
1935	356,326	51,100	999,804	E 53,947	1,906,781	1,539	42,727	1,337	44,064
1936	408,293	53,200	1,107,977	E 54,356	2,146,131	1,674	43,045	1,556	44,601
1937	430,777	50,400	1,207,651	E 72,404	2,384,988	1,887	46,173	1,827	48,000
1938	336,281	45,200	1,193,219	E 82,459	2,268,417	1,897	47,219	1,808	49,027
1939	376,098	49,700	1,263,305	E 86,776	2,453,614	2,012	46,355	1,894	48,249
1940	430,910	49,000	1,321,073	E 36,119	2,633,735	2,211	50,131	2,114	52,245
1941	492,115	52,700	1,438,533	E 27,699	2,754,344	3,399	53,207	2,331	55,538
1942	540,050	56,500	1,377,032	E 58,166	2,996,968	3,440	66,706	2,418	69,124
1943	593,797	57,100	1,472,063	E 58,227	3,363,580	3,552	79,078	2,497	81,575
1944	589,599	59,400	1,710,906	E 124,848	3,647,663	4,171	78,905	2,515	81,420
1945	559,567	51,600	1,758,505	E 97,018	3,838,524	4,652	84,747	2,562	87,309
1946	500,386	53,900	1,770,652	E 55,005	3,950,483	4,662	83,150	2,391	85,541
1947	545,891	48,200	1,907,686	E 51,287	4,365,617	5,371	83,066	1,915	84,981
1948	519,909	50,200	2,083,569	E 30,942	4,862,437	5,909	86,992	1,543	88,535
1949	445,538	37,700	1,965,828	I 1,704	5,109,667	6,309	94,773	1,588	96,361
1950	454,202	39,900	2,121,358	I 58,933	5,942,429	7,511	100,885	1,786	102,671
1951	468,904	37,000	2,390,860	I 7,760	7,002,534	8,409	104,376	2,178	106,554
1952	418,757	35,300	2,456,586	I 11,619	7,497,966	9,235	109,708	2,269	111,977
1953	426,798	28,000	2,571,089	I 18,965	7,879,715	9,745	109,617	2,008	111,625
1954	363,060	26,900	2,556,928	I 33,283	8,264,319	10,111	111,640	2,340	113,980

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[1] Data on consumption calculated from production minus exports plus imports, which includes shipments to noncontiguous Territories, and change in stocks. Except bituminous coal and lignite for 1933 to date, these data represent actual consumption, including a small amount of coal consumed in noncontiguous Territories.

[2] Thousand net tons.

[3] Thousand barrels.

[4] Million cubic feet.

[5] Revised.

[6] Million gallons.

[7] Million kilowatt-hours; source, Federal Power Commission, except production for 1920–42. For these years the fuel equivalent of waterpower, converted to kilowatt-hours at the prevailing rate of pounds of coal per kilowatt-hour at central electric stations.

TABLE 58.—Calculated consumption of energy fuels and energy from waterpower in trillion British thermal units and percentage contributed by each in the continental United States [1]

Year	Bituminous coal and lignite	Anthracite	Crude oil	Petroleum products net: E, exported; I, imported	Natural gas dry [2]	Natural-gas liquids	Waterpower	Grand total	Percentage							
									Bituminous and lignite	Anthracite	Crude oil	Petroleum products net: E, exported; I, imported	Natural gas dry	Natural-gas liquids	Waterpower	Total
1920	13,325	2,179	3,027	E 393	827	42	775	19,782	67.4	11.0	15.3	E 2.0	4.2	0.2	3.9	100.0
1921	10,266	2,082	3,016	E 342	682	50	656	16,410	62.6	12.7	18.4	E 2.1	4.1	.3	4.0	100.0
1922	11,185	1,443	3,390	E 319	785	56	675	17,215	65.0	8.4	19.7	E 1.9	4.6	.3	3.9	100.0
1923	13,598	2,208	4,419	E 389	1,032	90	727	21,685	62.7	10.2	20.4	E 1.8	4.8	.4	3.3	100.0
1924	12,681	2,050	4,228	E 464	1,170	103	685	20,453	62.0	10.0	20.7	E 2.3	5.7	.5	3.4	100.0
1925	13,079	1,627	4,641	E 485	1,212	124	701	20,899	62.6	7.8	22.2	E 2.3	5.8	.6	3.3	100.0
1926	13,954	1,961	4,876	E 545	1,335	149	765	22,495	62.0	8.7	21.7	E 2.4	5.9	.7	3.4	100.0
1927	13,095	1,897	5,027	E 650	1,465	179	815	21,828	60.0	8.7	23.0	E 3.0	6.7	.8	3.8	100.0
1928	13,069	1,871	5,474	E 711	1,588	200	890	22,381	58.4	8.4	24.4	E 3.2	7.1	.9	4.0	100.0
1929	13,612	1,815	5,894	E 600	1,942	246	847	23,756	57.3	7.6	24.8	E 2.5	8.2	1.0	3.6	100.0
1930	11,921	1,718	6,148	E 496	1,969	243	785	22,288	53.5	7.7	27.6	E 2.2	8.8	1.1	3.5	100.0
1931	9,743	1,484	5,304	E 339	1,715	200	692	18,799	51.8	7.9	28.2	E 1.8	9.1	1.1	3.7	100.0
1932	8,041	1,283	4,830	E 240	1,594	158	726	16,392	49.1	7.8	29.5	E 1.5	9.7	1.0	4.4	100.0
1933	8,323	1,260	5,143	E 299	1,600	144	729	16,900	49.2	7.5	30.4	E 1.8	9.5	.9	4.3	100.0
1934	9,008	1,410	5,136	E 318	1,819	161	721	17,937	50.2	7.9	28.6	E 1.8	10.2	.9	4.0	100.0
1935	9,336	1,298	5,799	E 300	1,974	169	831	19,107	48.9	6.8	30.4	E 1.6	10.3	.9	4.3	100.0
1936	10,697	1,351	6,426	E 302	2,221	184	841	21,418	49.9	6.3	30.0	E 1.4	10.4	.9	3.9	100.0
1937	11,286	1,280	7,004	E 400	2,468	208	905	22,751	49.6	5.6	30.8	E 1.7	10.8	.9	4.0	100.0
1938	8,811	1,148	6,921	E 456	2,348	209	899	19,880	44.3	5.8	34.8	E 2.3	11.8	1.1	4.5	100.0
1939	9,854	1,262	7,327	E 486	2,539	221	872	21,589	45.6	5.9	33.9	E 2.2	11.8	1.0	4.0	100.0
1940	11,290	1,245	7,662	E 175	2,726	243	917	23,908	47.2	5.2	32.1	E .7	11.4	1.0	3.8	100.0
1941	12,893	1,338	8,343	E 139	2,851	364	975	26,625	48.4	5.0	31.3	E .5	10.7	1.4	3.7	100.0
1942	14,149	1,435	7,987	E 320	3,102	367	1,177	27,897	50.7	5.2	28.6	E 1.1	11.1	1.3	4.2	100.0
1943	15,557	1,450	8,538	E 310	3,481	379	1,347	30,442	51.1	4.8	28.1	E 1.0	11.4	1.2	4.4	100.0
1944	15,447	1,509	9,923	E 662	3,775	442	1,387	31,821	48.5	4.7	31.2	E 2.1	11.9	1.4	4.4	100.0
1945	14,661	1,311	10,199	E 580	3,973	491	1,486	31,541	46.5	4.2	32.3	E 1.8	12.6	1.5	4.7	100.0
1946	13,110	1,369	10,270	E 283	4,089	493	1,446	30,494	43.0	4.5	33.7	E .9	13.4	1.6	4.7	100.0
1947	14,302	1,224	11,065	E 262	4,518	564	1,459	32,870	43.5	3.7	33.7	E .8	13.8	1.7	4.4	100.0
1948	13,622	1,275	12,085	E 147	5,033	619	1,507	33,994	40.1	3.8	35.5	E .4	14.8	1.8	4.4	100.0
1949	11,673	958	11,402	I 57	5,289	660	1,565	31,604	36.9	3.0	36.1	I .2	16.7	2.1	5.0	100.0
1950	12,900	1,013	12,304	I 402	6,150	783	1,601	35,153	36.7	2.9	35.0	I 1.1	17.5	2.2	4.6	100.0
1951	12,285	940	13,867	I 107	7,248	874	1,592	36,913	33.3	2.5	37.6	I .3	19.6	2.4	4.3	100.0
1952	10,971	897	14,248	I 132	7,760	954	1,614	36,576	30.0	2.4	39.0	I .4	21.2	2.6	4.4	100.0
1953	11,182	711	14,912	I 180	8,156	1,006	1,550	37,697	29.7	1.9	39.5	I .5	21.6	2.7	4.1	100.0
1954	9,512	683	14,830	I 260	8,554	1,042	1,479	36,360	26.2	1.9	40.8	I .7	23.5	2.8	4.1	100.0

[1] The heat values employed, which applied to data in table 57 are: Anthracite, 12,700 B. t. u. per pound; bituminous coal and lignite, 13,100 B. t. u. per pound; crude oil, 5,800,000 B. t. u. per barrel; weighted average British thermal units on petroleum products by using 5,248,000 gasoline, 5,670,000 kerosine, 5,825,000 distillate, 6,287,000 residual, 6,064,800 lubricants, 5,537,280 wax, 6,636,000 asphalt, and 5,796,000 miscellaneous; natural gas dry, 1,035 B. t. u. per cubic foot; natural-gas liquids weighted average British thermal units based on production; natural gasoline 110,000 B. t. u. per gallon, and LP-gas 95,500 B. t. u. per gallon. Waterpower converted to coal equivalent at the prevailing rate of pounds of coal per kilowatt-hour each year at central electric stations.

[2] Revised.

STOCKS

Stocks of bituminous coal and lignite in the hands of industrial consumers and in retail yards in 1945–54 are shown graphically in figure 2; the wide variations from month to month are caused almost entirely by prolonged strikes. Detailed figures on tonnage of stocks and on days' supply are shown in table 59. All these figures on stocks are based on complete coverage except "Other industrials" and "Retail yards." Stocks for these two categories are based on samples, and the statistical procedure followed is the same as for calculating total consumption, as described above.

TABLE 59.—Stocks of bituminous coal and lignite in hands of commercial consumers and in retail dealers' yards in the United States, 1953–54

Date	Total stocks (net tons)	Days' supply at current rate of consumption on date of stocktaking							
		Coke ovens	Steel plants	Other industrials	Electric utilities	Retail yards	Railroads	Cement mills	Total
1953									
Jan. 31	73,346,000	47	45	61	106	6	33	55	55
Feb. 28	71,385,000	46	43	57	107	5	33	51	54
Mar. 31	70,235,000	46	47	59	115	6	33	48	58
Apr. 30	70,531,000	47	49	60	121	7	32	48	62
May 31	72,912,000	48	61	70	134	14	34	50	71
June 30	76,026,000	50	64	75	127	16	38	55	72
July 31	74,752,000	45	63	78	126	15	36	54	71
Aug. 31	77,997,000	51	67	79	128	12	35	61	72
Sept. 30	81,005,000	56	68	78	127	9	37	65	71
Oct. 31	82,719,000	59	68	71	127	9	36	66	70
Nov. 30	82,381,000	60	63	65	123	10	37	67	69
Dec. 31	80,614,000	62	55	60	117	7	38	61	64
1954									
Jan. 31	75,741,000	57	51	57	111	4	39	54	59
Feb. 28	75,194,000	60	52	59	121	5	41	53	64
Mar. 31	72,033,000	59	48	60	121	4	42	49	65
Apr. 30	70,595,000	58	58	66	133	9	46	51	76
May 31	69,432,000	57	60	71	141	10	42	53	81
June 30	69,646,000	58	63	74	130	11	43	60	82
July 31	67,186,000	52	63	83	132	13	40	52	84
Aug. 31	68,566,000	56	63	78	129	10	37	53	80
Sept. 30	69,690,000	56	57	73	128	8	39	55	77
Oct. 31	70,349,000	52	53	68	126	6	34	54	72
Nov. 30	71,032,000	50	41	61	118	6	32	57	68
Dec. 31	69,201,000	48	37	56	106	4	30	52	60

PRICES

A detailed analysis of the trend in coal prices is given in the Minerals Yearbook, volume II, 1953 (pp. 143–44). The average value of bituminous coal and lignite, f. o. b. mines, declined sharply—8 percent—in 1954 from 1953.

The producers were asked, for the first time, to report the production and total value, f. o. b. mine, of coal "sold in the open market" and "not sold in the open market" in 1954. These figures are shown, by States, in table 61. Almost one-fifth of the bituminous coal and lignite in 1954 was "not sold in the open market," and the average value of this coal was $1.55 per ton greater than the average value of the coal "sold in the open market."

TABLE 60.—Average value per ton, f. o. b. mines, of bituminous coal and lignite produced in the United States, 1953–54, by States

State	1953				1954			
	Underground mines	Auger mines	Strip mines	Total all mines	Underground mines	Auger mines	Strip mines	Total, all mines
Alabama	$6.44	--------	$5.63	$6.33	$6.79	--------	$5.21	$6.55
Alaska	11.00	--------	8.64	9.81	11.23	--------	8.57	9.66
Arizona	6.25	--------	--------	6.25	6.23	--------	--------	6.23
Arkansas	8.43	--------	7.40	7.93	8.12	--------	6.84	7.52
California (lignite)	--------	--------	--------	--------	--------	--------	(1)	(1)
Colorado	5.50	--------	4.23	5.37	5.73	--------	3.92	5.54
Georgia	5.00	--------	--------	5.00	5.00	--------	--------	5.00
Illinois	4.02	--------	3.82	3.95	3.87	--------	3.74	3.82
Indiana	4.23	--------	3.76	3.94	3.84	--------	3.54	3.65
Iowa	4.55	--------	3.47	3.79	4.38	--------	3.52	3.76
Kansas	5.35	--------	4.12	4.14	5.29	--------	4.06	4.08
Kentucky	4.93	$3.75	3.19	4.66	4.46	$3.12	2.94	4.16
Maryland	4.88	4.53	4.22	4.60	4.72	--------	4.15	4.46
Missouri	5.48	--------	4.02	4.12	5.17	--------	3.91	3.99
Montana:								
Bituminous	4.78	--------	2.00	2.64	4.95	--------	(2)	2.79
Lignite	3.80	--------	3.53	3.77	(1)	--------	(1)	(1)
Total Montana	4.73	--------	2.00	2.66	--------	--------	--------	--------
New Mexico	6.08	--------	3.67	6.00	6.09	--------	(2)	5.91
North Dakota (lignite)	2.40	--------	2.36	2.36	(1)	--------	(1)	(1)
Ohio	4.26	3.28	3.50	3.78	4.16	3.16	3.35	3.62
Oklahoma	6.97	--------	5.52	6.10	7.46	--------	4.89	5.88
Pennsylvania	6.01	3.50	3.84	5.53	5.73	3.45	3.73	5.26
South Dakota (lignite)	--------	--------	3.47	3.47	--------	--------	(1)	(1)
Tennessee	4.77	3.43	3.57	4.60	4.08	4.42	3.56	3.96
Texas (lignite)	--------	--------	--------	--------	--------	--------	(1)	(1)
Utah	5.76	--------	--------	5.76	5.94	--------	--------	5.94
Virginia	5.38	5.46	4.71	5.34	4.48	3.79	4.03	4.45
Washington	7.31	--------	7.39	7.32	7.23	--------	7.25	7.23
West Virginia	5.27	4.16	4.14	5.17	4.77	3.53	3.55	4.67
Wyoming	5.28	--------	2.97	4.53	5.66	--------	2.54	4.08
Lignite [3]	--------	--------	--------	--------	3.38	--------	2.42	2.43
Other States [4]	--------	--------	--------	--------	--------	--------	2.06	--------
Total	5.27	4.20	3.75	4.92	4.87	3.41	3.52	4.52

[1] Included in lignite total; not published to avoid disclosure of individual operations.

[2] Included in "Other States"; not published to avoid disclosure of individual operations.

[3] Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

[4] Includes Montana (bituminous) and New Mexico.

TABLE 61.—Production and average value per ton, f. o. b. mines, sold in open market and not sold in open market, 1954, by States

State	Production (net tons)			Average value per ton, f. o. b. mines		
	Sold in open market	Not sold in open market	Total	Sold in open market	Not sold in open market	Total
Alabama	3,552,940	6,729,566	10,282,506	$5.62	$7.04	$6.55
Alaska	662,796	3,822	666,618	9.67	8.40	9.66
Arizona	10,925	----------	10,925	6.23	----------	6.23
Arkansas	476,055	1,213	477,268	7.52	7.03	7.52
California (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	2,020,305	879,486	2,899,791	4.80	7.25	5.54
Georgia	8,090	----------	8,090	5.00	----------	5.00
Illinois	40,087,771	1,883,365	41,971,136	3.84	3.36	3.82
Indiana	13,346,965	53,223	13,400,188	3.65	3.71	3.65
Iowa	1,192,444	4,254	1,196,698	3.76	5.03	3.76
Kansas	1,366,238	6,056	1,372,294	4.08	3.84	4.08
Kentucky	50,912,686	6,051,722	56,964,408	3.93	6.04	4.16
Maryland	412,958	8,658	421,616	4.48	3.40	4.46
Missouri	2,510,982	2,611	2,513,593	3.99	4.42	3.99
Montana (bituminous)	(1)	(1)	(1)	(1)	(1)	(1)
Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	121,014	2,085	123,099	5.88	7.60	5.91
North Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	29,866,033	2,602,695	32,468,728	3.67	3.00	3.62
Oklahoma	(1)	(1)	(1)	(1)	(1)	(1)
Pennsylvania	41,549,040	30,461,061	72,010,101	4.65	6.09	5.26
South Dakota (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Tennessee	6,213,945	214,886	6,428,831	3.95	4.27	3.96
Texas (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
Utah	(1)	(1)	(1)	(1)	(1)	(1)
Virginia	16,230,930	156,362	16,387,292	4.44	5.21	4.45
Washington	(1)	(1)	(1)	(1)	(1)	(1)
West Virginia	98,601,289	17,394,752	115,996,041	4.49	5.70	4.67
Wyoming	(1)	(1)	(1)	(1)	(1)	(1)
Other States [2]	9,306,066	6,801,011	16,107,077	3.97	5.09	4.44
Total	318,449,472	73,256,828	391,706,300	4.22	5.81	4.52

[1] Included in "Other States"; not published to avoid disclosure of individual operations.

[2] Includes California, Montana, North Dakota, Oklahoma, South Dakota, Texas, Utah, Washington, and Wyoming.

LIGNITE

TABLE 62.—Summary of number of mines, production, value, men working daily, days operated, man-days, output per man per day, and detailed operations at underground and strip lignite mines in the United States, 1954 [1]

OPERATIONS AT UNDERGROUND MINES

Number of mines		11
Shot off the solid	net tons	29,912
Cut by machines	do	17,060
Total production	do	46,972
Number of cutting machines		2
Average output per machine	net tons	23,486
Percent of total underground production cut by machines		36.3
Average value per ton		$3.38
Average number of men working daily:		
Underground		27
All other		2
Total		29
Average number of days worked		176
Number of man-days worked		5,094
Average tons per man per day		9.22

OPERATIONS AT STRIP MINES

Number of strip pits		44
Production at strip pits	net tons	4,195,834
Average value per ton		$2.40
Number of shovels and dragline excavators		75
Average number of men working daily:		
In strip pits		150
All other		386
Total		536
Average number of days worked		208
Number of man-days worked		111,586
Average tons per man per day		37.60

TOTAL OPERATIONS AT ALL LIGNITE MINES

Number of mines	55
Production (net tons):	
Shipped by rail [2]	2,239,839
Shipped by truck or wagon	1,756,850
Used at mines [3]	246,117
Total	4,242,806
Average value per ton	$2.43
Average number of men working daily:	
Underground	27
Surface: In strip pits	150
All others	388
Total	565
Average number of days worked	207
Number of man-days worked	116,680
Average tons per man per day	36.36

[1] Exclusive of small mines producing less than 1,000 tons. Detailed data, by States and counties, not published to avoid disclosure of individual operations. Includes lignite in California, Montana, North Dakota, South Dakota, and Texas.

[2] Includes coal loaded at mines directly into railroad cars and hauled by trucks to railroad siding.

[3] Includes coal used by mine employees, taken by locomotive tenders at tipple, used at mines for power and heat, made into briquets, and other uses.

FOREIGN TRADE [6]

Imports of bituminous coal and lignite are very small, although exports have been an important item of foreign trade for many years, particularly since the close of World War II. A detailed analysis of exports and imports of bituminous coal and lignite is shown in Minerals Yearbook, volume II, 1953 (pp. 146–150).

TABLE 63.—Bituminous coal [1] imported for consumption in the United States, 1952–54, by countries and customs districts, in net tons

[U. S. Department of Commerce]

	1952	1953	1954
COUNTRY			
North America: Canada	262, 264	226, 900	198, 799
Europe: France	4		
Total	262, 268	226, 900	198, 799
CUSTOMS DISTRICT			
Alaska	777	414	
Buffalo	772		876
Chicago		48	
Dakota	541	563	
Duluth and Superior	147	42	1, 197
Hawaii			606
Maine and New Hampshire	128, 909	116, 909	126, 430
Michigan		58	
Minnesota	50		
Montana and Idaho	129, 876	106, 658	69, 192
New York	4		
Ohio		(2)	
Philadelphia	15		
St. Lawrence	50		
Washington	1, 127	2, 208	498
Total	262, 268	226, 900	198, 799

[1] Includes slack, culm, and lignite.
[2] Less than 1 ton.

TABLE 64.—Exports of bituminous coal, by country groups, 1945–49 (average) and 1950–54, in thousand net tons

[U. S. Department of Commerce]

Year	Canada (including Newfoundland) and Mexico	West Indies and Central America [1]	"Overseas" (all other countries)							Grand total
			Miquelon, Bermuda, and Greenland	South America	Europe	Asia	Africa	Oceania	Total "overseas"	
1945–49 (average)	22, 379	254	46	1, 671	16, 306	534	1, 075	53	19, 685	42, 318
1950	23, 010	108	1	1, 303	794	147	105		2, 350	25, 468
1951	22, 823	125	13	3, 016	27, 926	1, 889	919	11	33, 774	56, 722
1952	20, 984	77	7	2, 280	20, 672	3, 053	541	29	26, 582	47, 643
1953	19, 626	69	2	1, 747	8, 312	3, 915	89		14, 065	33, 760
1954	15, 964	58	(2)	1, 385	10, 471	3, 049	114		15, 019	31, 041

[1] Includes Bahamas and Panama.
[2] Less than 1,000 tons.

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[6] Figures on imports and exports compiled by M. B. Price and E. D. Page, of the Bureau of Mines, from records of the U. S. Department of Commerce.

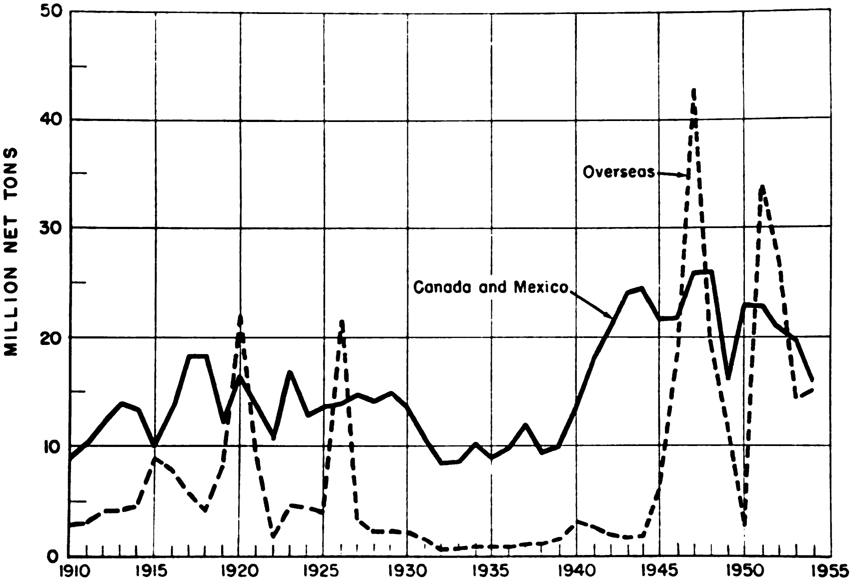

FIGURE 17.—Exports of bituminous coal and lignite from the United States to Canada and Mexico and overseas, 1910–54.

TABLE 65.—Bituminous coal exported from the United States, 1951–54, by countries of destination, in net tons [1]

[U. S. Department of Commerce]

Country	1951	1952	1953	1954
North America:				
Bermuda	612	2, 460	1, 779	595
Canada	22, 823, 044	20, 956, 569	19, 584, 135	15, 910, 572
Central America:				
British Honduras	20	20	15	----------
Costa Rica	100	55	20	----------
El Salvador	75	187	95	140
Guatemala	190	130	181	150
Honduras	248	287	253	25
Nicaragua	16	6	12	----------
Panama	30	40	----------	----------
Greenland	11, 461	4, 627	----------	----------
Mexico	907	27, 496	42, 278	52, 915
Miquelon and St. Pierre	444	----------	315	----------
West Indies:				
British:				
Jamaica	30, 274	12, 584	12, 528	14, 451
Leeward and Windward Islands	11, 060	----------	----------	----------
Trinidad and Tobago	11, 974	18, 774	15, 325	2, 566
Other British	----------	5	5	----------
Cuba	64, 808	38, 339	36, 626	39, 278
Dominican Republic	177	75	55	75
French	5, 467	6, 526	4, 259	1, 303
Haiti	15	15	15	----------
Netherlands Antilles	176	50	----------	----------
Total, North America	22, 961, 098	21, 068, 245	19, 697, 896	16, 022, 070

For footnote, see end of table.

TABLE 65.—Bituminous coal exported from the United States, 1951–54, by countries of destination, in net tons [1]—Continued

[U. S. Department of Commerce]

Country	1951	1952	1953	1954
South America:				
Argentina	1,632,480	1,073,938	553,693	8,795
Bolivia	2,810	3,763	14,123	----------
Brazil	1,026,952	875,507	812,804	1,073,991
Chile	219,496	230,943	271,053	214,379
Surinam	2,590	3,615	1,969	4,413
Uruguay	128,370	92,286	93,278	83,066
Other South America	3,505	60	62	101
Total, South America	3,016,203	2,280,112	1,746,982	1,384,745
Europe:				
Austria	929,356	720,804	67,069	421,543
Belgium-Luxembourg	1,495,110	711,519	644,303	265,118
Denmark	1,075,809	953,273	6,399	224,622
Finland	191,218	204,693	----------	9,284
France	4,305,301	3,169,758	373,946	68,861
Germany	6,047,167	[2] 7,182,086	[2,3] 3,135,255	1,383,979
Gibraltar	170,587	46,025	----------	----------
Greece	----------	----------	----------	30,849
Iceland	4,865	----------	3,980	----------
Ireland	681,679	220,228	----------	----------
Italy	5,085,519	3,158,088	1,884,241	3,542,830
Netherlands	3,368,526	2,077,716	[3] 1,238,026	1,944,583
Norway	991,523	173,480	99,980	206,827
Portugal	139,286	27,265	10,336	41,849
Spain	14,800	209,164	46,417	275,236
Sweden	942,039	798,476	53,479	429,676
Switzerland	1,062,053	647,952	196,152	194,186
Trieste	118,395	49,027	105,767	242,511
United Kingdom	1,302,260	216,366	----------	461,091
Yugoslavia	----------	106,301	446,270	728,193
Total, Europe	27,925,493	20,672,221	8,311,620	10,471,238
Asia:				
Indonesia	13,803	8,255	32,683	14,536
Japan	1,564,472	2,785,313	3,873,888	2,921,144
Korea, Republic of	----------	----------	----------	111,608
Pakistan	310,945	255,740	6,273	----------
Other Asia	20	3,076	2,229	1,290
Total, Asia	1,889,240	3,052,384	3,915,073	3,048,578
Africa:				
Algeria	401,592	192,942	10,916	----------
Angola	9,989	3,342	----------	56,462
Belgian Congo	32,242	105,245	22,276	16,409
Canary Islands	66,452	16,271	----------	----------
Egypt	106,212	21,870	44,525	30,519
Ethiopia	----------	----------	----------	10,543
French Morocco	76,574	18,369	----------	----------
French West Africa	80,217	33,525	----------	----------
Gold Coast	10,362	74,859	----------	----------
Madeira Islands	8,886	4,046	----------	----------
Tunisia	107,823	49,383	----------	----------
Other Africa	17,967	21,209	10,975	----------
Total, Africa	918,316	541,061	88,692	113,933
Oceania	11,197	29,127	----------	----------
Grand total	56,721,547	47,643,150	33,760,263	31,040,564

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[1] Amounts stated do not include fuel or bunker coal loaded on vessels engaged in foreign trade, which aggregated 908,269 tons in 1951, 723,372 tons in 1952, 605,019 tons in 1953, and 427,072 tons in 1954.

[2] West Germany.

[3] Revised figure.

TABLE 66.—Bituminous coal exported from the United States, 1951–54, by customs districts, in net tons

[U. S. Department of Commerce]

Customs district	1951	1952	1953	1954
North Atlantic:				
Maine and New Hampshire	3,629	6,456	3,843	5,790
Massachusetts	------	------	------	3,608
New York	4,169	59	[1] 148	297
Philadelphia	356,978	390,073	24,636	17,787
Rhode Island	------	723	------	------
South Atlantic:				
Georgia	------	176	------	------
Maryland	3,861,883	2,981,228	[1] 1,621,147	627,921
South Carolina	646,454	344,351	------	------
Virginia	28,742,863	22,563,456	[1] 12,384,828	14,262,824
Gulf Coast:				
Florida	562	588	17	49
Laredo	------	------	408	28
Mobile	193,143	126,975	147,701	234,389
New Orleans	1,462	3,382	[1] 970	260
Sabine	10	377	------	1,781
Mexican border:				
Arizona	308	164	119	64
El Paso	488	27,266	27,131	9,263
Pacific Coast:				
Los Angeles	10,065	20,496	10,251	5,600
Oregon	15,552	58,228	------	------
San Diego	77	53	25	50
San Francisco	830	5	------	------
Washington	118,800	224,670	23,283	2,030
Northern border:				
Buffalo	1,036,728	853,663	850,784	603,415
Chicago	925,479	1,192,503	759,546	640,837
Dakota	36,559	43,283	44,705	43,675
Duluth and Superior	350,332	354,055	47,854	37,228
Michigan	3,572,549	3,033,863	2,676,464	2,064,034
Montana and Idaho	1,637	2,793	1,255	593
Ohio	11,551,859	11,057,815	11,629,093	9,538,246
Rochester	3,160,056	2,394,845	2,018,576	1,737,287
St. Lawrence	2,126,249	1,959,833	1,451,990	1,132,094
Vermont	1,388	1,762	1,835	1,444
Wisconsin	200	------	------	------
Miscellaneous:				
Alaska	5	9	4	------
Hawaii	40	------	------	------
Pittsburgh	1,193	------	------	------
Total	56,721,547	47,643,150	[2] 33,760,263	[2] 31,040,564

[1] Revised figure.

[2] Includes 33,650 tons in 1953 and 69,970 tons in 1954, representing estimated data for which district breakdown not available.

TABLE 67.—Shipments of bituminous coal to possessions and other areas administered by the United States, 1952–54 [1]

[U. S. Department of Commerce]

Territory	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
Guam	2	$400	------	------	------	------
Puerto Rico	11,459	153,138	3,311	$39,291	8,287	$105,492
Virgin Islands	10,515	101,272	------	------	4,507	37,228

[1] Data cover "coal and related fuels."

WORLD PRODUCTION

World production of anthracite and bituminous coal amounted to 1,635 million net tons in 1954 and lignite to 517 million tons, a total of 2,152 million tons. The total coal output in 1954 (including lignite), was 7 million tons less than in 1953. Of the total world coal output, 71 percent was produced in 4 countries—the United States, Russia, Germany, and United Kingdom. The United States supplied 420 million tons of bituminous coal, anthracite, and lignite, or 20 percent of the world output, in 1954.

Most coal-producing countries in Europe enjoyed slightly increased production during 1954; however, consumption requirements of the principal coal-producing countries on the European Continent exceeded available supplies. Production from the United States made up a large part of the deficit.

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1950–54, in thousand short tons [1]

[Compiled by Pauline Roberts and Berenice B. Mitchell]

Country	1950	1951	1952	1953	1954
North America:					
Canada:					
Bituminous	16,936	16,364	15,496	13,879	12,789
Lignite	2,203	2,223	2,083	2,021	2,117
Greenland: Bituminous	8	9	8	[2] 8	[2] 8
Mexico: Bituminous	1,005	1,233	1,452	1,579	1,448
United States:					
Anthracite (Pennsylvania)	44,077	42,670	40,583	30,949	[3] 27,118
Bituminous	512,941	530,374	463,823	454,439	[3] 389,220
Lignite	3,370	3,291	3,017	2,851	[3] 2,780
Total	580,540	596,164	526,462	505,726	435,480
South America:					
Argentina: Bituminous	29	43	120	91	[2] 220
Brazil: Bituminous (including lignite)	2,159	2,164	2,162	2,238	[2] 2,200
Chile: Bituminous (raw coal)	2,444	2,437	2,701	2,575	2,499
Colombia: Bituminous	1,113	1,157	[2] 1,430	[2] 1,350	1,650
Peru: Bituminous and anthracite	216	205	248	309	216
Venezuela: Bituminous	28	31	28	32	35
Total	5,989	6,037	[2] 6,700	[2] 6,600	[2] 6,800
Europe:					
Albania: Lignite [2]	55	65	110	220	330
Austria:					
Bituminous	202	216	209	179	195
Lignite	4,749	5,517	5,709	6,144	6,928
Belgium: Bituminous and anthracite	30,116	32,685	33,493	33,135	32,241
Bulgaria:					
Anthracite [2]	28	31	33	33	33
Lignite (including bituminous) [2]	6,265	7,015	8,130	9,050	9,500
Czechoslovakia:					
Bituminous	20,344	20,283	22,377	22,377	23,700
Lignite	30,347	31,879	35,064	36,115	39,793
Denmark: Lignite	849	1,744	1,405	880	754
France:					
Bituminous and anthracite	56,036	58,395	61,029	57,968	59,971
Lignite	1,858	2,208	2,194	2,147	2,105
Germany:					
Bituminous and anthracite:					
East Germany	3,094	3,767	3,886	3,417	3,470
West Germany	122,507	132,195	137,570	138,509	142,233
Lignite:					
East Germany	152,450	169,425	176,700	194,350	196,504
West Germany	83,717	91,930	92,095	93,355	96,795
Pech coal: West Germany	1,702	1,839	1,898	1,819	1,905
Greece: Lignite	180	211	279	489	885
Hungary:					
Bituminous	1,650	1,797	2,050	2,300	[2] 2,650
Lignite	13,051	15,013	18,596	21,150	[2] 22,000

For footnotes, see end of table.

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1950–54, in thousand short tons [1]—Continued

Country	1950	1951	1952	1953	1954
Europe—Continued					
Ireland: Bituminous and anthracite	190	197	183	184	176
Italy:					
Bituminous and anthracite	1,136	1,286	1,200	1,247	1,174
Lignite	861	969	928	850	703
Netherlands:					
Bituminous	13,500	13,695	13,814	13,555	13,306
Lignite	214	312	259	278	190
Poland:					
Bituminous	85,981	90,381	93,076	97,660	100,641
Lignite	5,336	6,500	6,800	7,600	7,800
Portugal:					
Bituminous and anthracite	470	461	487	527	476
Lignite	105	91	85	78	72
Romania:					
Bituminous and anthracite [3]	330	330	440	550	600
Lignite [3]	3,220	3,850	4,300	4,400	5,000
Saar	16,635	17,945	17,896	18,098	18,539
Spain:					
Bituminous and anthracite	12,255	12,735	13,519	13,663	13,666
Lignite	1,451	1,650	1,764	1,974	1,935
Svalbard (Spitsbergen): Bituminous [4]	607	793	778	761	594
Sweden: Bituminous	341	308	383	314	293
Switzerland:					
Bituminous and anthracite	33	22	[3] 11	[3] 11	[3] 11
Lignite			(5)	(5)	(5)
U. S. S. R.:					
Bituminous and anthracite [3]	226,000	243,600	253,500	273,400	294,300
Lignite [3]	60,600	66,100	78,300	82,700	88,200
United Kingdom:					
Great Britain: Bituminous and anthracite	242,283	249,614	253,668	251,107	250,940
Northern Ireland: Bituminous	1	1	1	2	2
Yugoslavia:					
Bituminous	1,272	1,093	1,114	1,020	1,080
Lignite	12,858	12,181	12,221	11,377	13,961
Total [3]	1,214,900	1,300,300	1,357,600	1,405,000	1,455,700
Asia:					
Afghanistan: Bituminous	10	14	13	18	17
China: Bituminous, anthracite, and lignite	40,785	47,675	[3] 57,300	[3] 62,800	[3] 73,900
India: Bituminous	36,184	38,564	40,659	40,297	41,187
Indochina: Anthracite	545	708	948	917	1,068
Indonesia: Bituminous	886	957	1,057	989	991
Iran: Bituminous [6]	[3] 160	187	165	171	[3] 130
Japan:					
Bituminous and anthracite	42,394	47,743	47,795	51,292	47,091
Lignite	1,419	1,547	1,696	1,638	1,587
Korea:					
Anthracite:					
Korea, Republic of	626	142	635	956	982
North Korea [3]	1,700	1,100	850	1,100	1,200
Lignite:					
Korea, Republic of	31	7	2	(5)	------------
North Korea [3]	550	550	440	440	660
Malaya: Bituminous	465	429	353	321	251
Pakistan: Bituminous	489	565	671	654	621
Philippines: Bituminous	175	166	153	171	132
Taiwan (Formosa): Bituminous	1,549	1,827	2,520	2,638	2,335
Turkey (raw coal):					
Bituminous	4,807	5,214	5,342	6,232	6,299
Lignite	1,338	1,387	1,529	1,809	2,315
U. S. S. R., including Sakhalin, southern: Bituminous	(7)	(7)	(7)	(7)	(7)
Total [3]	134,100	148,800	162,100	172,400	180,800
Africa:					
Algeria: Bituminous and anthracite	284	272	297	325	334
Belgian Congo: Bituminous	176	240	279	347	418
French Morocco: Anthracite	406	434	507	623	536
Madagascar: Bituminous	2	6	4	6	1
Mozambique: Bituminous	62	86	127	179	[3] 220
Nigeria: Bituminous	654	616	650	785	712
Southern Rhodesia: Bituminous	2,346	2,535	2,821	2,887	3,029
Tunisia: Lignite	45	9	------------	------------	------------

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1950–54, in thousand short tons [1]—Continued

Country	1950	1951	1952	1953	1954
Africa—Continued					
Union of South Africa: Bituminous (marketable)	29,181	29,357	30,935	31,371	32,314
Total	33,156	33,555	35,620	36,523	37,564
Oceania:					
Australia:					
Bituminous	18,534	19,721	21,734	20,620	22,133
Lignite	8,207	8,777	9,076	9,248	10,451
New Zealand:					
Bituminous and anthracite	1,032	759	966	868	912
Lignite	1,959	1,969	2,114	1,954	1,994
Total	29,732	31,226	33,890	32,690	35,490
Other countries (estimate)	110	110	110	110	110
Total all grades (estimate)	1,999,000	2,116,000	2,122,000	2,159,000	2,152,000
Lignite (total of items shown above) (estimate)	399,000	438,000	467,000	495,000	517,000
Bituminous and anthracite (by subtraction)	1,600,000	1,678,000	1,655,000	1,664,000	1,635,000

[1] This table incorporates a number of revisions of data published in previous Coal chapters.
[2] Estimate.
[3] The production total of bituminous, anthracite, and lignite for 1954 will be compared with the Bureau of the Census total for this commodity. Differences in the totals will be adjusted or explained.
[4] Includes the following quantities, in thousand short tons, produced in U. S. S. R.-controlled mines: 1950, 206; 1951, 274; 1952, 279; 1953, 290; and 1954, 220 (estimated).
[5] Negligible.
[6] Year ended March 20 of year following that stated.
[7] Output from U. S. S. R. in Asia included with U. S. S. R. in Europe.

COAL TECHNOLOGY [7]

Exploration, Geology, and Reserves.—During the year, the Federal Geological Survey was particularly active in its exploration, reserves, and coal-geology studies.[8] Detailed reports were published describing the geology and coal deposits in certain coal areas in Indiana, Colorado, Wyoming, North Dakota, Kentucky, New Mexico, and Utah. The Federal Geological Survey has also published estimated coal reserves by beds and counties in categories of thickness and suitability for strip mining, which summarize the reserves of Indiana and certain coal-bearing areas in Montana, North Dakota, and Alaska.

The Bureau of Mines continued its study of coking-coal estimates and published reports covering 2 counties each in Kentucky and West Virginia and 1 in Tennessee. The latter report includes preparation and carbonization studies, in addition to estimates of reserves.

The Ohio State Geological Survey has conducted coal reserve studies on the Lower Kittanning No. 5 bed in Ohio.[9]

Constitution, Petrography, Properties, and Analysis.—Coal technologists in State, Federal, and educational institutions in this country and abroad were particularly active in investigating the constitution and fundamental properties of coals. During the year, a comprehensive publication by Francis [10] discussed coal, its properties and constitution. The same writer[11] also proposed a new coal-classification system based on values of elementary analysis of humins and chemical composition.

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[7] Prepared by J. B. Goodman and E. P. Carman.
[8] Geological Survey material supplied by P. Averitt, Fuels Branch, Geological Survey.
[9] Brant, Russell A., The Lower Kittanning No. 5 Coal Bed in Ohio: State of Ohio, Division of Geological Survey, Report of Investigations 21, 1954, 59 pp.
[10] Francis, Wilfrid, Coal, Its Formation and Composition: E. Arnold, London, 1954, 567 pp.

At Pennsylvania State University work has been in progress on the constitution of coal, the properties of coal ash with reference to fusibility, and X-ray and infrared studies of coals, products, and related substances. Data on the chemical structure of coal and the changes occurring with progressive carbonization were reported by van Krevelen.[12]

X-ray studies were made by numerous workers on vitrain coals. Orchin[13] indicates that basic structural units of coals are similar, although a wide variety of molecular-weight fragments exist. Differences in physical and chemical properties are explained by variations in the hydrogen bonding between the basic units that constitute the coal.

Further progress was made in coal-constitution studies by extractive methods that avoid permanent destruction of coal substances when they are examined by pyrolytic methods. Extracts from a wide variety of coking and noncoking coals were examined by infrared spectrometer,[14] and extracts of European bituminous coals[15] were appraised by several methods.

The conventional approach to coal constitutive properties by the thermal and distillation methods has shown that it is possible to recognize distinct thermal-curve types by correlation with the physical, chemical, and structural changes in the coal.[16] The nature of the residual volatile matter contained in coked coal was reported by British investigators.[17]

The Bureau of Mines tested the application of reflectivity techniques to petrographic analysis. Results showed a difference between those samples prepared from briquetted granules and from fractions isolated from a single piece.

The International Standards Organization and the Bureau of Mines cooperated in continuing efforts to establish an international coal-classification system. Samples of lignites and brown coals were exchanged between a number of European countries and the United States for parallel analyses as an aid in developing an international coal-classification system for high-moisture, low-rank coals. Independently, British workers also made substantial contributions. A résumé of the progress and the latest conclusions were published.[18]

The coal-research laboratories of the Illinois State Geological Survey established the relationship between oxidation and the coking property of an Illinois coal. Other investigations established the relationship between the ultimate composition of coal and low-temperature oxidation at 100° C. in both open and sealed apparatus. Netherland investigators considered a series of fundamental basic properties of coals and thus far has reported on seven.

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[11] Francis, W., [A Rational Scientific Classification of Coal]: Brennstoff Chem., vol. 34, No. 21-22, Nov. 18, 1953.

[12] van Krevelen, D. W., [Our Present Physical and Chemical Picture of Coal]: Brennstoff Chem., vol. 35, No. 19-20, October 1954, pp. 289-298.

[13] Orchin, M., Engineering Experiment Station News: Ohio State University, vol. 25, No. 5, December 1953, pp. 25-31.

[14] Kirby, W. A., Lakey, J. R. A., and Sarjent, R. J., A Study of Coal Extracts by Infrared Spectroscopy: Fuel, vol. 33, October 1954, pp. 480-496.

[15] Berti, V., Siniramed, C., and Manci, C., [Studies on the Extraction of Bituminous Coals with Solvents. I. Sulcis Coal: Extraction with Various Types of Solvents and Quality of the Extracts]: Revista dei combustibili, vol. 8, No. 9, September 1954, pp. 639-667.

[16] Glass, Herbert D., Investigation of Rank of Coal by Differential Thermal Analysis: Econ. Geol., vol. 49, May 1954, pp. 294-309.

[17] Bisphem, T., and Weston, F. R., Nature of the Volatile Matter in Coke: Jour. Inst. Fuel, vol. 27, April 1954, pp. 201-208.

[18] King, J. J., International Methods of Coal Analysis: Coke and Gas, vol. 16, February 1954, pp. 55-60

Interest in the feasibility of recovering germanium from coals continued. The Bureau of Mines[19] cooperated with the United States Army Signal Corps in evaluating industrial coals as a potential source of germanium.

The Bureau of Mines and the Federal Geological Survey[20] cooperated with the Atomic Energy Commission in studying the extent and quality of the uraniferous lignites found in North and South Dakota, particularly those in Harding County, S. Dak.

Research in this country and abroad is being carried out to develop better methods for analyzing and testing coals. A critical study of the factors affecting coal calorimetry was made by English investigators.[21] The accuracy of coal-sampling apparatus[22] [23] and the magnitude and type of errors occurring in preparing samples for coal analysis[24] [25] were investigated by British and French technologists.

Underground Mining.—During 1954 considerable progress was made in reducing the production cost of raw coal by increased mechanization and improvements in mining methods.

Continuous mining machines, which cut and remove coal from the bed without drilling and blasting, were more widely adopted. It has been estimated that, at the close of 1954, over 320 continuous-mining machines of all types were either sold or already in underground operation. These accounted for 6 percent of total underground output—a 38-percent increase over 1953.

New types of continuous miners were also presented to the industry. One of these is the "Wilcox miner,"[26] which is designed to operate in 24- to 40-inch beds. The Dosco miner,[27] developed by the Dominion Coal Co. of Canada, produces coal at a high rate under severe mining conditions (steeply pitching beds). The Haarman scraper-peeler,[28] another mechanical miner, is a recent European development. An adaptation of the scraper boxes used for loading coals in thin beds, it features improved overall safety aspects.

The American coal industry has shown strong interest in the German coal planer (plow) operating on a modified longwall face. The advantages of mechanical longwall mining over conventional mining methods are definitely appealing.

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[19] Corey, R. C., Myers, J. W., Selvig, W. A., and Berger, L. B., Occurrence and Determination of Germanium in Coal Ash From Power Plants: Pres. at 16th Annual Fuels Conference, AIME-ASME, Chicago, Ill., October 1953.

[20] Schopf, James M., and Gray, Ralph J., Microscopic Studies of a Uraniferous Coal Deposit: Geol. Survey Circ. 343, 1954, 10 pp.

[21] Mott, R. A., and Thomas, W. C., Studies in Bomb Calorimetry, I. Determination of the Calorific Value of Solid Fuels. Mott, R. A., and Barker, J. E., Studies in Bomb Calorimetry, II. Determination of the Calorific Value of Liquid Fuels: Fuel, vol. 33, October 1954, pp. 448–479.

[22] Coryell, R. L., Schwerd, F. J., and Parente, E. J., Tests of Accuracy of a Mechanical Coal Sampler: Combustion, vol. 25, June 1954, p. 50.

[23] Blatter, A. O., A Test on a Slotted Revolving Cylinder Coal Sampler: ASTM Preprint 103-B, 1954 15 pp.

[24] Tomlinson, R. C., Experiments to Determine the Errors Occurring in the Preparation of Samples for Coal Analyses: Jour. Inst. Fuel, vol. 27, October 1954, pp. 515–522.

[25] Rieffel, E., and Danqugny, J., [Contribution to the Study of Sampling, Reduction, and Analysis of Solid Mineral Fuels]: Chaleur et industrie, vol. 35, No. 351, October 1954, pp. 277–302.

[26] Coal Age, vol. 60, No. 2, February 1955, p. 124.

[27] Browne, E. H., Recent Novel Developments and Experiments in the Mining Industry: Coll. Guardian, vol. 188, March 1954, pp. 253–261.

[28] McGill, D. G., The Haarman Scraper-Peeler: Coll. Guardian, vol. 188, March 1954, pp. 351–356.

The use of air and chemical coal-breaking techniques has increased. Demonstrated late in 1953 and during 1954, chemical coal-breaking agents provide improved roof control, promoted greater safety, and increased production. Preparation-plant tests also demonstrated a definite increase in the yield of plus-6-inch lump. Known as Chemechol,[29] [30] electrical heat energy of about 7 seconds' duration is used to initiate a gas pressure-producing chemical reaction, which decomposes ammonium nitrate to inert gaseous compounds.

Effective reductions in total mine costs per ton were obtained by a broader application of the extensible belt conveyor, which can carry coal as far as 1,000 feet from the advancing miner, collecting and discharging the broken coal at a fixed point.

The control of roof falls in American underground mining is still an important problem. In roof bolting, the relationship between the torque applied to the bolt and the corresponding bolt load was established. It was shown that an indicating torque wrench is accurate enough for most general practices.

Floating-platform boring for proving undersea coal reserves has been proposed. This speculative proposal is of interest, because of current successful offshore petroleum-drilling operations now in this country.[31]

Although draglines continued to be favored, the application of larger capacity stripping shovels, combined with matched loading and haulage units, permitted some operators to eliminate draglines and reduce costs.

Costs of stripping by shovels and draglines were reduced by operators who employed a positive preventative maintenance program, rotated spare dragline buckets regularly, placed hard surfacing materials on wear points, and systematically changed bucket teeth.

With the large reserves of thin-cover stripping coal being rapidly used up, many large producers are confronted with the problem of handling cover that, in some instances, exceeds 80 feet. This has led to an intensive search for a stripping unit amenable to mining under these difficult conditions As a result of this study, the stripping wheel has been developed and tested. This wheel, potentially a very significant development in mechanized mining of coal, has high capacity and can move spoil much farther than conventional shovels and smaller dragline equipment. The stripping wheel was reported to have over three times the capacity of comparable draglines or shovels.[32]

Considerable attention has been given to the use of ammonium nitrate as an open-pit or strip-coal mine explosive when mixed with other constituents and used in plastic bags.

Preparation.—More critical and exacting consumer needs caused coal producers to modernize and improve their facilities, particularly in fine-coal cleaning equipment, with improved dewatering, filtering, and drying techniques.

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[29] Mechanization, vol. 18, March 1954, pp. 77–79.

[30] Coal Age, vol. 59, No. 10, October 1954.

[31] Browne, E. H., Recent Novel Developments and Experiments in the Mining Industry: Coll. Guardian, vol. 188, March 1954, pp. 253–261 (see footnote 27).

[32] Kolbe, Frank F., Developing the Wheel for American Coal Stripping: Coal Age, vol. 60, No. 3, March 1955, pp. 58–65.

In 1954 the Bureau of Mines station at Seattle, Wash., studied the fundamentals of particle-size behavior in heavy-medium suspensions. Performance of the heavy-medium processes, related to the density of separation, and an appraisal of coal-washing results were presented at the Second International Coal-Preparation Congress in Essen, Germany, in September 1954.[33]

With increased mechanization in the coal-mining industry, the percentage of fine sizes in the coal as mined has increased, thereby accentuating the problem of coal preparation. In continuing its study of froth flotation, the Bureau of Mines investigated the relative efficiencies of vacuum and mechanical laboratory froth-flotation cells.[34] It was found that the mechanical flotation cell is more efficient than the vacuum flotation cell. A study of froth flotation for cleaning fine coal, from the standpoint of a rate process, was made by English investigators.[35]

Additional coal-preparation studies were carried out in Europe during 1954. Published test data[36] showed that the use of coal cleaned by flotation methods resulted in coke having good mechanical properties and low phosphorus content for blast-furnace use. British investigators[37] reported possible improvements in the techniques of coal separation and washing, particularly by applying chemical engineering practices.

Transportation.—A significant development in coal transportation was successfully carried through the pilot plant stage by the Pittsburgh Consolidation Coal Co.—hydraulic transportation by pipeline. Plans to construct a commercial pipeline were announced in October 1954. When completed, it will transport 3,600 tons of coal per day from its preparation plant at Georgetown, Ohio, to an electric-power-generating plant at Eastlake, Ohio—a distance of 108 miles. Much original development and testing of suitable types of primary and booster pumps, materials of construction for pipelines, and problems of corrosion associated with this work were necessary.

The Bureau of Mines at Denver, Colo., in cooperation with the Texas Power & Light Co., investigated the feasibility of hydraulic transportation of a Texas lignite and a Colorado bituminous coal on a small pilot-plant scale. At Rockdale, Tex., the transportation within the plant, of minus ¼-inch natural and dried lignite using pneumatic methods, has also been demonstrated.[38]

Storage of Coal.—Storage of higher rank coal seldom presents any particularly difficult problems; however, the lower rank coals, such as the subbituminous coals and lignites, are susceptible to auto-oxidation and spontaneous heating when not properly stored. A report published by the Bureau in 1954[39] reviews the subject in general and specifically describes the ultimate storage of 4 to 6 million tons of lignite excavated from the Garrison Dam site in North Dakota, where the Bureau of Mines cooperated with the Army Corps of Engineers in studying storage problems.

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[33] Yancey, H. F., and Geer, M. R., Some Practical Aspects of Appraising Coal-Washing Results: 2d Internat. Coal-Preparation Cong., Essen, Germany, September 20–25, 1954.

[34] Riley, H. L., and Gandrud, B. W., Laboratory Evaluation of Vacuum Flotation for Cleaning Coal Fines: Bureau of Mines Rept. of Investigations 5071, 1954, 33 pp.

[35] Brown, D. J., and Smith, H. G., The Flotation of Coal as a Rate Process: Coll. Guardian, vol. 189, No. 4870, 1954, 33 pp.

[36] Levin, V. L., [Influence of Coal Flotation Concentration on the Quality of Blast-Furnace Coke] Ugol., No. 9, September 1954, pp. 32–37.

[37] Steadman, A. T., Chemical Engineering and Coal Preparation: Chem. and Process Eng., vol. 35, September 1954, pp. 267–271.

[38] Parry, V. F., Low-Temperature Carbonization of Coal and Lignite for Industrial Uses: Bureau of Mines Rept. of Investigations 5123, 1955, 27 pp.

[39] Allen, R. R., and Parry, V. F., Storage of Low-Rank Coals: Bureau of Mines Rept. of Investigations 5034, 1954, 31 pp.

Briquetting.—The briquetting of bituminous coal and lignite in the United States has declined in recent years. Current developments in North American coal-briquetting procedures and descriptions of a wide variety of applications have been reported in the Proceedings of the Third International Briquetting Conference[40] at Banff, Alberta, Canada, in the fall of 1953. The pelletizing of thermally pretreated lignite is of considerable interest. Investigations were carried out with varied binders to determine the effect of particle size and size distribution in achieving satisfactory agglomeration with a minimum of binder consumption.

Utilization.—*Burning as Fuel.* Fossil fuels abound in the United States—the largest per capita consumer of energy in the world. Notwithstanding their apparent abundance, the lavish use of power and energy is beginning to accent noticeably the depletion of certain reserves.[41] [42]

The growing activity in nuclear power generation has commanded increased attention from both fossil-fuel technologists[43] and fuel producers.[44] The Atomic Energy Commission has estimated that, by 1975, 2 to 10 percent of the total electric energy production will be supplied from atomic sources.[45] The tremendous potential of this source of energy is illustrated by the study of the radioactive excitation of carbon reputedly undertaken as a research project by the Fairchild Engine & Aeroplane Corp.[46] The cost of a nuclear power station compared to a coal-steam station of equal output, however, has been estimated to be approximately three times as great.[47] This is an obvious deterrent, except where cost is not a limiting condition. It is expected that ultimate use of nuclear power generation is inevitable, but it is also anticipated that its growth will be spread over a period of years. Complacency should not exist in the field of fossil-fuel technology, because production of liquid and gaseous fuels and coal chemicals ultimately will have to substitute for natural liquid and gaseous fuels. This emphasizes the immediate necessity for a strong and continuing program of coal technological research.

The forecasts for future energy production by experts in the field and including those reported by the Paley Commission in 1952 (vol. 1, p. 120) indicate that a steady growth of electric power production is to be expected, with increase at the rate of about 6 percent a year for approximately the next 25 years. Even with the assistance from nuclear-energy electric power production, this increase will have to be met largely by coal. An overall survey of the developments in power and fuel utilization for 1954 was given in the Proceedings of the American Power Conference.[48]

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[40] Coal Briquetting Conference, Vol. III, 1953, Sponsored by Natural Resources Research Institute, University of Wyoming, Laramie, Wyo.

[41] Tobey, J. E., Romance of Power and Fuels: Mech. Eng., vol. 74, No. 10, October 1952, pp. 812–815.

[42] Furnas, C. C., Energy Resources of the Future: Ind. Eng. Chem., vol. 96, December 1954, pp. 2446–2447.

[43] Colliery Guardian, Fuel Resources and Their Conservation: Vol. 189, November 4, 1954, pp. 587–588.

[44] Thring, N. W., Jour. Inst. Fuel, vol. 27, August 1954.

[45] Coal Age, vol. 59, No. 9, September 1954, p. 135.

[46] Power, Nuclear Power Notes: Vol. 99, No. 1, January 1955, p. 102.

[47] Petroleum Press Service, vol. 22, March 1955, p. 76.

[48] American Power Conference, March 24–26, 1954, vol. 16, sponsored by Illinois Inst. of Technology Chicago, Ill.

Several major utilities are examining the possibility of increasing thermal efficiency by operating furnaces at supercritical pressures.

A comprehensive study of the development of the cyclone burner was made by a British investigator.[49] This traces the development from the early vortex furnaces of 30 years ago to the modern Babcock & Wilcox slagging cyclone furnace. All phases of the performance, operating conditions, power requirements, position of installation, etc., were considered. Developments in the cyclone furnace and boiler design were also reviewed by Kessler.[50]

A paper by engineers of a major combustion-equipment manufacturer on progress and developments in spreader-stoker firing[51] reviewed the history of spreader-stoker firing and the development of a furnace and boiler design specifically adapted to the spreader-type stoker. New data on crossfeed firing, a method as yet little used in fuels combustion, was published by the Bureau of Mines.[52] This gave hitherto unavailable data on a third acceptable method of fuel firing at ignition and burning rates with very high air rates that are far above those attainable with traditional grate-burning methods. The influence of coal size on combustion performance in underfeed-stoker-fired boiler furnaces was also studied.[53]

Lignite is becoming increasingly popular in areas where it is the principal indigenous fuel for power generation. A number of plants have demonstrated that it may be prepared and burned by one of several methods, including pulverization. The fuel flexibility built into modern steam-generating units permits them to give creditable performance with fuels normally considered unsuitable by standards of past years. Studies conducted[54] at the Aurora Steam Electric Station of the Minnesota Power & Light Co. showed that it is not necessary to pulverize lignite finer than 70 percent through the 200-mesh screen. The pulverized lignite had good flame stability as fired in the tangential type burners. A dual purpose application of lignite for both power generation and crude coal-chemicals production has been demonstrated by Bureau of Mines engineers and industry.[55]

Performance tests were carried out in 1954 on a new high-pressure steam-turbine locomotive. The results were reported in papers presented at the 1954 Annual Meeting of the American Society of Mechanical Engineers.[56] The progress, during 1954, of research on the coal-burning gas turbine for locomotive use, in which coal-supply studies and ash-separator developments, among others, have been considered, was also reported.[57]

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[49] Sharpe, G. C. H., The Cyclone Furnace: British Coal-Utilization Research Assoc., Monthly Bull., vol. 18, No. 8, August 1954 (Review 139), pp. 349–372.

[50] Kessler, George W., Cyclone Furnace Boilers: Proc. Am. Power Conf., vol. 16, March 1954, pp. 78–90.

[51] Coykendall, L. L., and Loughlin, P. R., Boiler and Furnace Designed for Spreader-Stoker Firing: Trans. Am. Inst. Mech. Eng., vol. 76, No. 6, August 1954, pp. 878–881.

[52] Graf, E. G., Carman, E. P., and Corey, R. C., Pure Crossfeed Ignition in Fuel Beds: Combustion, vol. 26, No. 3, September 1954, pp. 59–66.

[53] Stevens, C. W., Coal Giving Trouble? Check Its Size Consist: Power, vol. 99, No. 1, January 1955, pp. 100–101.

[54] Bogot, Alex., and Gandsey, G. E., Standard Pulverizing Equipment Gives Good Performance With Lignite: Combustion, vol. 26, No. 6, December 1954, pp. 38–43.

[55] Parry, V. F., Low-Temperature Carbonization of Coal and Lignite for Industrial Uses: Am. Inst. Chem. Eng., Ann. Meeting, December 1953, St. Louis, Mo.

Lignite Fuels 240,000-kw. Alcoa Plant at Rockdale: Power Eng., vol. 58, June 1954, pp. 80–82, 125.

[56] Hamilton, C. C., Evans, P. D., and Stoddart, R. P., Coal-Fired Steam-Turbine-Electric Locomotive for Norfolk & Western Railway: Am. Soc. Mech. Eng. Paper 54–A–185; and Moseley, I. N., Performance of Norfolk & Western Railway Co., Experimental Coal-Burning Steam-Turbine-Electric Locomotive 2300: Am. Soc. Mech. Eng. Paper 54–A–251. See also: Mechanical Engineering, Norfolk & Western Coal-Fired Steam-Turbine-Electric Locomotive, Part I, Construction and Test Program, and Part II, Performance in Service: Vol. 77, No. 7, July 1955, pp. 588–595.

[57] Yellott, John I., and Broadley, Peter R., Coal-Burning Gas-Turbine Progress in 1953: Combustion, vol. 25, No. 11, May 1954, pp. 55–57.

Though incidental to the thermal energy releasing process, the importance of the reactions of coal minerals during combustion was studied.[58] The paper considered the temperatures developed in combustion systems and the primary and secondary reactions through which coal minerals may go at elevated temperatures.

Carbonization.—A review of current coal-carbonization techniques indicates a steady trend of improvement and several well-defined advances in the industry during the past year. Because of the time required for most normal byproduct-coking operations, efforts were made to develop "rapid" carbonization processes. Fundamental studies in this field were made by British investigators.[59] A continuous-carbonization process was reported, using a traveling grate.[60] Classed as an "autogenetic" coking process, it employs restricted air admission to a horizontal layer of coal, moving on an ordinary traveling-grate stoker within a closed furnace. The process is said to transform coal to coke at 15 to 30 times the rate in conventional slot-type ovens, thus presenting low-cost possibilities. The process also appears to be amenable to a variety of coal ranks, both coking and noncoking, and can be used for producing lump chars.[61]

Bureau of Mines interest in developing new carbonization techniques has continued. A pilot-scale slot-type oven was developed and tested.

At Gorgas, Ala., the Bureau of Mines, in cooperation with the Alabama Power Co., successfully initiated underground gasification of coal in place, using an electrocarbonization technique for initial opening of gasification passages through the coal beds.[62] An investigation of a similar type was carried out independently at Hume, Mo. by the Hume-Sinclair Coal Co. in cooperation with the University of Missouri School of Mines and Metallurgy.[63]

In England, factors in coke formation were evaluated in a comprehensive report dealing with the problem of coking.[64]

Various types of modern coke ovens built under 14 principal designs were classified into a single simplified system, considering such basic features as coking chamber, method of firing, etc.[65] Fuel technologists at Battelle Institute reviewed the progress of carbonization research with regard to the availability, treatment, and properties of coking coals and coke oven and carbonization methods.[66]

Gasification.—Coal gasification is of interest to many, since the estimated peak production of natural gas, in the order of 12 trillion cubic feet per year is expected to be reached by about 1960. At that time, due to the rapidly increasing population rate, production of both manufactured and natural gas may be entirely inadequate. Since coal offers the largest known resource of fossil fuel, complete conversion of coal to gas would insure a virtually unlimited supply for the foreseeable future.

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[58] Whittingham, G., High-Temperature Reactions of Coal Minerals During Combustion: British Coal Utilization Research Assoc., Monthly Bull., vol. 18, No. 12, December 1954, pp. 581–590.

[59] Kirby, R. A., The Rapid Carbonization of Coal: British Coal Utilization Research Assoc. Monthly Bull., vol. 18, No. 6, June 1954, Review 137, pp. 241–259.

[60] Baum, K., Continuous Coking Process Promises Low-Cost Production: Combustion, vol. 26, No. 5, November 1954, pp. 61–65.

[61] Baum, Kurt, [Autogenous Coking; a New Process for the Simultaneous Production of Cheap Process Coke and Thermal Energy]: Brennstoff-Warme-Draft, vol. 35, No. 13-14, July 1954, pp. 244–249.

[62] Fies, M. H., and Elder, J. L., Fuels Technology—Underground Gasification of Coal at Gorgas, Ala.: Mech. Eng., vol. 76, No. 2, February 1954, pp. 189-190.

[63] Cheasley, T. C., Forrester, J. D., and Sarapuu, Erich., Underground Electrocarbonization of Coal and Related Hydrocarbons: Min. Eng., vol. 6, No. 9, September 1954, pp. 908–915 and Trans. AIME, vol. 199, September 1954, pp. 908–915.

[64] Dryden, I. G. C., and Griffith, M., Physical and Chemical Factors in the Early Stages of Coke Formation: British Coal Utilization Research Assoc., Monthly Bull., vol. 18, No. 2, February–March 1954, Review 134, pp. 62–86.

[65] Farafanow, W., Modern Coke Ovens; Their Classification and Certain Technological Characteristics: Gas World, vol. 140, August 7, 1954 (Coking sec.) pp. 35–44, 46.

[66] Nelson, H. W., and Ward, James J., Present and Future Aspects of Carbonization Research: Proc. AIME, vol. 12, December 1953, pp. 182–195 (disc., pp. 195–197).

The Bureau of Mines has actively continued its investigations to develop acceptable substitutes for natural gas by various methods. At the Appalachian Experiment Station, Morgantown, W. Va., the possibility of producing a high-B. t. u. gas from coal as an alternative source of pipeline fuel and the variables connected with gasification of pulverized anthracite with oxygen and steam were studied.

Studies of the gasification of lignite in externally heated retorts were continued at the Lignite Experiment Station, Grand Forks, N. Dak. At the synthetic fuels demonstration plant formerly operated at Louisiana, Mo., data were obtained from the Koppers horizontal and a vertical slagging gasifier, operating at atmospheric pressure with oxygen and steam. An operational analysis of the units was also reported.[67] British workers supplied new viewpoints on the complete gasification of coal in their papers which appeared during 1954.[68] [69] [70] The last article in this group presents a review and discussion of past and present methods in use in Great Britain.

Synthetic Liquid Fuels.—Synthetic liquid fuels may be produced by either of two methods: (1) By direct hydrogenation of coal or (2) by using gas-synthesis procedures. The Bureau of Mines is continuing its synthetic fuel investigations of both methods in its Bruceton, Pa., and Morgantown, W. Va., laboratories. An improved, single-step coal-hydrogenation process for direct conversion to gasoline was investigated in a pilot plant. Differing from conventional hydrogenation processes, the liquid- and vapor-phase stages are combined in one unit that operates at 500° C., with a large quantity of catalyst.

Conventional gas-synthesis procedures for liquid fuels have long been studied by the Bureau of Mines. Catalyst studies and heat-transfer problems in this connection are perhaps the most important and necessary single factors in conventional gas-synthesis procedures to produce liquid fuels. Iron catalysts were shown to be particularly effective in demonstration tests on a commercial-plant scale.[71]

By employing other variations in the Fischer-Tropsch gas-synthesis techniques and using specially treated fine iron catalysts, it was found possible to produce high yields (up to 80 percent) of products of the oxygen-rich (alcohol) variety.[72] Normal ethyl predominated, but quantities of methyl and higher alcohols were obtained.

The new South African commercial-scale project for producing synthetic liquid fuels and chemicals was announced,[73] as was British progress on the synthesis, chemistry of synthesis catalysts, and structure of fuel oils.[74] Indian workers, reporting in British journals,[75] determined equilibrium reaction rates on catalyst surfaces, the effects of feed-gas composition and space velocity, the reduction of catalyst on utilization ratio, and the nature of the oil products. Variables that affect performance of the Fischer-Tropsch synthesis, particularly the effects of diluents in the synthesis gas, were discussed by British workers.[76]

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[67] Batchelder, H. R., and Busche, R. M., Kinetics of Coal-Gasification Design of Atmospheric Pressure Gasifiers: Ind. Eng. Chem., vol. 46, No. 2, December 1954, pp. 2501–2508.

[68] Tully, J. E. T., Gas Manufacture by the Tully Complete Gasification Process: Gas Jour., vol. 279, September 1954, pp. 782–787.

[69] Gaskill, M. S., The "Carrier-Gas" Process: Coke and Gas, vol. 16, April 1954, pp. 153–158.

[70] Coke and Gas, Complete Gasification: Vol. 16, April 1954, pp. 137–142 (staff article).

[71] Benson, H. E., Field, J. H., Bienstock, D., and Storch, H. H., Oil-Circulation Process for Fischer-Tropsch Synthesis: Ind. Eng. Chem., vol. 46, No. 11, November 1954, pp. 2278–2285.

[72] Schlesinger, M. D., Benson, H. E., Murphy, E. M., and Storch, H. H. Chemicals From the Fischer-Tropsch Synthesis: Ind. Eng. Chem., vol. 46, No. 6, June 1954, pp. 1322–1326.

[73] Chemical and Process Engineering, The Sasol Oil—From Coal Works: Vol. 35; and Corrosion Technology, vol. 1, May 1954, pp. 153–155.

Chemical and Miscellaneous Uses.—Continued interest in coal-to-chemicals production is encouraging and indicative of possible future wider scale use of coal. The production of much-needed aromatics from coal and coal tars is logical from theoretical considerations Since it has been established that coal has an aromatic structure, it will produce by thermal or extractive treatment, many aromatics that cannot be obtained from petroleum sources, except by extensive and circuitous processing.

The growing use of synthetic fibers of the orlon type has led to a sharp increase in demand for acetylene, used in synthesizing acrylonitrile. The Sachse process, in which hydrocarbons such as coal and coal-tar hydrocarbon gases are partly oxidized to produce acetylene, has been proposed to supply this demand.

Potentially, large quantities of coal tar may be produced by low-temperature carbonization of low-rank coals. Wide-scale carbonization of these coals, however, will depend, by economic necessity, upon an integrated process from which maximum return is achieved from the tar. One such outlet for the tar may be the conversion to pitches and carbons for use in electro-metallurgical industries such as the electro reduction of aluminum.

Several major power companies investigated the possibility of using waste fly ash as a pozzolanic-type admixture with normal portland cements in concrete construction and extensive work on this also was carried out by the Bureau of Reclamation, United States Department of the Interior.[77] Road building materials, using bituminous shales, were studied at Iowa State College where investigations of other waste coal materials are planned. In this same category of nonfuel use of coal products, the Sinclair Coal Company investigated the preparation of a light-weight construction aggregate from spent coal shale and the University of Kentucky investigated the recovery of elemental sulfur from pyritic coal wastes.

A new mixture of coal and coal tar pitch was developed for use as foundry mold facing and core binder compounds.

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[74] Petroleum, Fuel Research—1953: Vol. 17 November 1954, pp. 401–406.

[75] Basak, N. G., and Bhattacharyya, K. K., Fischer-Tropsch Synthesis; a Study of the Reaction Mechanism: Jour. Inst. Fuel, vol. 27, April 1954, pp. 195–200.

[76] Gibson, E. J., and Hall, C. C., Fischer-Tropsch Synthesis with Cobalt Catalysts. II. The Effect of Nitrogen, Carbon Dioxide and Methane in the Synthesis Gas: Jour. Appl. Chem., vol. 4, August 1954, pp. 464–468.

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Coal—Pennsylvania Anthracite

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GENERAL SUMMARY

TOTAL PRODUCTION of Pennsylvania anthracite in 1954 was 29.1 million tons, a 6-percent decline from 1953. As the small decrease in exports to Canada was more than compensated for by increased shipments to Western Europe, the net decline was attributable to losses in American markets to competitive fuels and to a relatively low demand for heat.

Although it is impossible to calculate anthracite market losses in recent years on the basis of weather conditions alone because of such contributory factors as fuel prices at the consuming level, the volume of new construction, and sales of conversion and replacement equipment, two conclusions are apparent: (1) The demand for heat in a particular space is determined by the severity of weather conditions; and (2) as Pennsylvania anthracite is predominantly a space-heating fuel, at least part of the decline in the demand for anthracite is due to the fact that the winter of 1953–54 marked the sixth successive heating season in which above-normal temperatures prevailed in the major anthracite-marketing areas.

Competition was intense at the producing level throughout 1954, with the result that the f. o. b. mine-price structure was marked by instability and, in some instances, wide departures from published price lists. Under these circumstances, retail fuel dealers were reluctant to build up yard stocks, apparently preferring to operate with a low inventory while waiting for attractive wholesale price quotations to develop. This action of some dealers also undoubtedly contributed to the unstable price situation. Consequently, the average value per net ton of total production fell from $9.67 to $8.52 (12 percent), and the total product value declined 17 percent. The difference in the percentages of decline for total value of product and value per ton was due to the fact that average prices for the Buckwheat No. 3 (Barley) and smaller sizes, which are normally used for industrial pruposes, were practically the same as in 1953, whereas average prices for the Buckwheat No. 2 (Rice) and larger sizes, which are higher priced and comprise the bulk of total production, were considerably lower.

During 1954 producing companies used several methods to reduce production costs. As in 1953, many operators curtailed or abandoned deep-mining operations at high-cost sites and placed greater emphasis upon obtaining a proportionately larger output from surface sources. Definite trends developed also, which indicated an expansion in the purchase of run-of-mine coal for preparation from lessees and small operators without preparation facilities. Special attention was also given to increasing the efficiency of mine labor through revised work schedules and the fuller use of mechanical equipment. These efforts were effective, as is evidenced by the fact that, although the average number of men employed declined 24 percent the productivity rate increased from 3.28 to 4.02 tons per man-day, the highest on record.

Mechanical loading increased in 1954 and composed 41 percent of the total coal loaded underground compared with 38 percent in 1953. The percentage of anthracite produced underground in 1954 remained the same as in 1953—58 percent of the total—while production at strip pits and culm banks also remained relatively the same, each being less than 1 percent under the 28 and 13 percent recorded, respectively, in 1953. The recovery of coal from rivers and creeks climbed from 1 percent of the total 1953 output to approximately 3 percent of total production in 1954.

Owing to the large output of strip- and culm-bank coal, the Schuylkill region again led in production, with 45 percent of the total, followed by the Wyoming region, with 41 percent, and the Lehigh, with 14 percent. When compared with similar data for 1953, these figures indicate no relative change for the Schuylkill region, a 3-percent increase in the Wyoming region, and an equivalent decrease in the Lehigh. On the basis of actual tonnage in the 2 years however, 1954 production in the Lehigh region was 23 percent less than in 1953, 6 percent less in the Schuylkill, and 2 percent greater in the Wyoming. The sharp decline in production and employment in the Lehigh region was due, aside from market conditions, to the fact that a major producing company closed all operations in the spring, idling approximately 4,300 men. In June, after the operating company had failed to reach an accord with the mine workers concerning working conditions, the company withdrew from all mining activities. Subsequently, 2 lessees reopened part of the mines, 1 in October and the other in December.

At the close of the year stocks held in retail yards were estimated by the Bureau of Mines to be 34 percent (770,000 tons) less than on December 31, 1953, and producer stocks, as reported by the Anthracite Committee, declined 33 percent (623,000 tons) for the same period.

It was evident that the total demand for anthracite in 1954 was considerably stronger than was indicated by the rate of production and that, had stocks not been drawn upon so heavily, it would have proved necessary to increase production more nearly in line with 1953 to satisfy all requirements. See tables 1, 2, and 3 for summary data on the Pennsylvania anthracite industry.

TABLE 1.—Salient statistics of the Pennsylvania anthracite industry, 1950–54

	1950	1951 [1]	1952 [1]	1953 [1]	1954 [1]
Production:					
Loaded at mines for shipment outside producing region:					
Breakers net tons	37, 658, 864	36, 204, 268	33, 807, 596	25, 074, 456	22, 576, 353
Washeries do	882, 541	923, 610	1, 309, 061	1, 242, 306	1, 445, 514
Dredges do	488, 739	379, 460	310, 964	299, 799	654, 410
Sold to local trade and used by employees net tons	3, 930, 889	4, 125, 495	4, 228, 430	3, 711, 235	3, 798, 919
Used at collieries for power and heat net tons	1, 115, 670	1, 037, 164	926, 507	621, 356	608, 281
Total production do	44, 076, 703	42, 669, 997	40, 582, 558	30, 949, 152	29, 083, 477
Value at breaker, washery, or dredge	$392,398,006	$405,817,963	$379,714,076	$299,139,687	$247, 870, 023
Average sales realization per net ton on breaker shipments to points outside producing region:					
Domestic	$11. 94	$13. 19	$13. 07	$13. 31	$11. 67
Steam	$5. 25	$5. 48	$5. 78	$6. 60	$6. 07
Total all sizes	$9. 34	$9. 94	$9. 81	$10. 15	$9. 06
Percent of total breaker shipments to points outside producing region:					
Domestic	61. 1	57. 8	55. 3	52. 9	53. 4
Steam	38. 9	42. 2	44. 7	47. 1	46. 6
Producers' stocks at end of year [2] net tons	1, 268, 300	982, 396	1, 708, 887	1, 915, 919	1, 292, 922
Exports [3] do	3, 891, 569	5, 955, 535	4, 592, 060	2, 724, 270	2, 851, 239
Imports [3] do	18, 289	26, 812	29, 370	31, 443	5, 831
Consumption (apparent) do	39, 900, 000	37, 000, 000	35, 300, 000	28, 000, 000	26, 900, 000
Average number of days worked	211	208	201	163	164
Average number of men working daily	72, 624	68, 995	65, 923	57, 862	43, 996
Output per man per day net tons	2. 83	2. 97	3. 06	3. 28	4. 02
Output per man per year do	597	618	615	535	659
Quantity cut by machines do	611, 734	496, 085	386, 128	318, 699	381, 424
Quantity mined by stripping do	11, 833, 934	11, 135, 990	10, 696, 705	8, 606, 482	7, 939, 680
Quantity loaded by machines underground net tons	12, 335, 650	10, 847, 787	10, 034, 464	6, 838, 769	6, 978, 035
Distribution:					
Total receipts in New England [4] do	3, 677, 738	3, 174, 473	2, 887, 640	2, 106, 343	1, 897, 283
Exports to Canada [3] do	3, 798, 285	3, 484, 800	3, 606, 618	2, 601, 818	2, 456, 747
Loaded into vessels at Lake Erie [5] net tons	611, 409	460, 776	478, 534	263, 705	283, 922
Receipts at Duluth-Superior [6] do	297, 814	156, 917	226, 956	81, 678	94, 835

[1] Figures for 1951–54 are not strictly comparable with those for previous years. See Production and Employment sections, Pennsylvania Anthracite chapter, Minerals Yearbook, 1951.

[2] Anthracite Committee.

[3] U. S. Department of Commerce.

[4] Commonwealth of Massachusetts, Division on the Necessaries of Life; and Association of American Railroads.

[5] Ore and Coal Exchange, Cleveland, Ohio.

[6] U. S. Engineer Office, Duluth, Minn.

TABLE 2.—Statistical summary of monthly developments in the Pennsylvania anthracite industry in 1954

(All tonnage figures represent net tons)

	January	February	March	April	May	June	July	August	September	October	November	December	Year 1954	Change from 1953 (percent)	Year 1953
Production (including mine fuel, local sales, and dredge coal)	2,874,000	2,525,000	2,364,000	2,100,000	2,013,000	2,387,000	2,080,000	2,270,000	2,416,000	2,353,000	2,681,000	3,020,000	29,083,000	−6.0	30,949,000
Shipments (breakers and washeries only, all sizes):															
By rail [1]	2,010,484	1,577,941	1,477,814	1,403,302	1,408,679	1,736,254	1,476,086	1,722,791	1,864,088	1,939,855	2,001,716	2,203,834	20,822,844	−10.6	23,290,616
By truck [2]	827,603	692,635	678,931	640,751	562,727	394,041	388,190	446,592	548,582	546,330	688,695	868,996	7,284,073	+8.2	6,733,912
Carloadings [3]	38,247	33,872	31,937	28,901	29,308	34,845	30,318	33,197	36,230	37,262	38,553	42,713	415,383	−12.4	474,272
Distribution:															
Lake Erie loadings [4]	--------	--------	--------	28,286	10,631	26,940	29,731	47,502	46,361	59,875	31,491	3,105	283,922	+7.7	263,705
Lake Ontario loadings [5]	--------	--------	--------	--------	--------	--------	--------	--------	1,952	--------	--------	--------	1,952	−89.1	17,906
Receipts at Duluth-Superior [6]	--------	--------	--------	6,553	--------	4,909	15,348	9,959	18,101	35,918	4,047	--------	94,835	+16.1	81,678
Upper Lake dock trade: [7]															
Receipts:															
Lake Superior	--------	48	--------	6,558	47	4,909	15,161	10,014	18,101	35,657	10,436	--------	100,931	+36.6	73,906
Lake Michigan	3,866	2,298	1,692	19,070	8,528	15,402	20,195	22,514	28,568	26,819	11,833	2,905	163,690	+4.4	156,785
Deliveries (reloadings):															
Lake Superior	11,715	3,915	2,354	1,674	3,506	12,702	10,380	3,820	12,588	19,163	12,121	14,014	107,952	+1.1	106,780
Lake Michigan	21,317	15,240	13,234	6,915	13,288	16,899	15,103	10,863	16,732	17,965	13,926	16,861	178,343	−12.3	203,254
New England receipts:															
Tidewater [8]	--------	--------	--------	--------	3,207	--------	--------	790	--------	--------	--------	--------	3,997	−77.8	18,024
Rail [8]	172,158	158,638	116,974	112,986	137,922	187,487	136,017	158,692	154,337	167,516	184,553	206,006	1,893,286	−9.3	2,088,319
Exports [9]	246,143	192,555	129,631	151,736	145,406	216,732	146,760	239,550	272,785	402,981	358,543	348,417	2,851,239	+4.7	2,724,270
Imports [9]	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	5,831	5,831	−81.5	31,443
Industrial consumption and stocks:															
Railroads (Class 1 only); [3]															
Consumption	59,427	49,672	49,941	37,380	30,256	24,420	22,692	23,405	24,360	30,566	42,240	51,584	445,943	−16.2	531,938
Stocks	61,648	63,831	55,114	50,806	51,436	52,650	58,312	77,553	85,995	82,334	66,527	77,020	77,020	+27.5	60,390
Electric utilities: [10]															
Consumption	296,488	261,614	276,176	239,604	235,671	258,248	269,443	265,895	269,232	262,558	261,145	270,031	3,166,105	−12.4	3,613,949
Stocks	2,324,528	2,313,047	2,301,412	2,339,004	2,406,033	2,450,180	2,427,719	2,456,040	2,484,162	2,523,220	2,614,986	2,635,834	2,635,834	+13.6	[11]2,320,942
Stocks on Upper Lake docks: [7]															
Lake Superior	74,171	70,290	67,907	72,797	69,338	60,696	65,431	71,620	76,868	93,287	91,403	77,262	77,262	−10.1	85,923
Lake Michigan	68,677	55,735	44,193	54,619	49,603	48,107	53,199	64,850	76,686	85,540	83,447	69,491	69,491	−19.3	86,128
Stocks in retail dealer yards [12]	1,968,000	1,765,000	1,507,000	1,514,000	1,573,000	1,721,000	1,716,000	1,771,000	1,757,000	1,642,000	1,631,000	1,495,000	1,495,000	−34.0	2,265,000
Retail dealer deliveries [13]	1,752,000	1,350,000	1,261,000	809,000	906,000	1,045,000	887,000	834,000	1,044,000	1,003,000	1,152,000	1,584,000	13,627,000	−7.4	14,722,000
Producers' stocks [14]	1,726,437	1,665,511	1,383,924	1,340,158	1,252,149	1,223,465	1,244,420	1,328,160	1,404,510	1,504,421	1,293,393	1,292,922	1,292,922	−32.5	1,915,919

Wholesale price indexes (1947-49=100):[15]															
F. o. b. mines:															
Chestnut	137.3	137.3	137.3	113.6	118.3	120.1	120.1	121.2	121.2	117.0	118.3	119.6	123.4	−9.7	136.6
Pea	126.8	126.8	126.8	105.4	110.8	112.4	112.4	113.4	113.4	108.4	109.5	111.0	114.8	−9.3	126.6
Employee wages and hours:[15]															
Average weekly earnings	$70.93	$74.84	$63.74	$64.45	$62.74	$96.20	$73.58	$82.50	$56.88	$86.27	$85.26	$89.86	$75.60	+3.7	$72.91
Average hourly earnings	$2.48	$2.52	$2.49	$2.46	$2.47	$2.65	$2.52	$2.50	$2.41	$2.53	$2.53	$2.56	$2.52	+1.6	$2.48
Average number hours worked per week	28.6	29.7	25.6	26.2	25.4	36.3	29.2	33.0	23.6	34.1	33.7	35.1	30.0	+2.0	29.4

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[1] Furnished by Anthracite Institute.

[2] Pennsylvania Department of Mines.

[3] Association of American Railroads.

[4] Ore and Coal Exchange, Cleveland, Ohio.

[5] Buffalo Branch, Ore and Coal Exchange, Cleveland, Ohio.

[6] U. S. Engineer Office, Duluth, Minn.

[7] Includes all commercial docks on Lake Superior and west shore of Lake Michigan as far south as Kenosha. Based on data courteously supplied by Maher Coal Bureau and direct reports to the Bureau of Mines.

[8] Furnished by Commonwealth of Massachusetts, Division on the Necessaries of Life.

[9] U. S. Department of Commerce.

[10] Federal Power Commission.

[11] Revised.

[12] Estimated from reports submitted by a selected list of retail dealers.

[13] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.

[14] Anthracite Committee. Represents coal in ground storage on nearest available date to the end of the month.

[15] Bureau of Labor Statistics.

TABLE 3.—Historical statistics of the Pennsylvania anthracite industry, 1890–1954

Year	Production (net tons)	Value of production	Average value per net ton	Exports [1] (net tons)	Imports [1] (net tons)	Apparent consumption [2] (net tons)	Average number of employees	Average number of days worked	Average tons per man per day	Average tons per man per year	Quantity cut by machines [3] (net tons)	Quantity produced by stripping [4] (net tons)	Quantity loaded mechanically underground [5] (net tons)
1890	46,468,641	$66,383,772	$1.43	889,655	16,962	45,596,000	126,000	200	1.85	369	-----------	-----------	-----------
1891	50,665,431	73,944,735	1.46	964,601	42,120	49,743,000	126,350	203	1.98	401	-----------	-----------	-----------
1892	52,472,504	82,442,000	1.57	953,836	72,865	51,592,000	129,050	198	2.06	407	-----------	-----------	-----------
1893	53,967,543	85,687,078	1.59	1,493,281	60,220	52,534,000	132,944	197	2.06	406	-----------	-----------	-----------
1894	51,921,121	78,488,063	1.51	1,613,500	100,876	50,408,000	131,603	190	2.08	395	-----------	-----------	-----------
1895	57,999,337	82,019,272	1.41	1,647,195	158,297	56,510,000	142,917	196	2.07	406	-----------	-----------	-----------
1896	54,346,081	81,748,651	1.50	1,512,000	113,892	52,948,000	148,991	174	2.10	365	-----------	-----------	-----------
1897	52,611,681	79,301,954	1.51	1,454,620	27,478	51,185,000	149,884	150	2.34	351	-----------	-----------	-----------
1898	53,382,645	75,414,537	1.41	1,513,062	3,527	51,873,000	145,504	152	2.41	367	-----------	-----------	-----------
1899	60,418,005	88,142,130	1.46	1,912,732	68	58,505,000	139,608	173	2.50	433	-----------	-----------	-----------
1900	57,367,915	85,757,851	1.49	1,853,163	132	55,515,000	144,206	166	2.40	398	-----------	-----------	-----------
1901	67,471,667	112,504,020	1.67	2,232,504	320	65,239,000	145,309	196	2.37	464	-----------	-----------	-----------
1902	41,373,595	76,173,586	1.84	1,016,934	190,636	40,547,000	148,141	116	2.40	279	-----------	-----------	-----------
1903	74,607,068	152,036,448	2.04	2,249,920	196,837	72,554,000	150,483	206	2.41	496	-----------	-----------	-----------
1904	73,156,709	138,974,020	1.90	2,495,799	81,232	70,742,000	155,861	200	2.35	469	-----------	-----------	-----------
1905	77,659,850	141,879,000	1.83	2,497,581	38,350	75,201,000	165,406	215	2.18	470	-----------	-----------	-----------
1906	71,282,411	131,917,694	1.85	2,483,005	36,236	68,836,000	162,355	195	2.25	439	-----------	-----------	-----------
1907	85,604,312	163,584,056	1.91	3,021,841	11,085	82,594,000	167,234	220	2.33	512	-----------	-----------	-----------
1908	83,268,754	158,178,849	1.90	3,082,641	18,462	80,205,000	174,174	200	2.39	478	-----------	-----------	-----------
1909	81,070,359	149,181,587	1.84	3,183,840	3,574	77,890,000	[6] 171,195	205	[7] 2.31	[7] 474	-----------	-----------	-----------
1910	84,485,236	160,275,302	1.90	3,384,222	9,180	81,110,000	169,497	229	2.17	498	-----------	-----------	-----------
1911	90,464,067	175,189,392	1.94	3,980,479	2,759	86,486,000	172,585	246	2.13	524	69,907	-----------	-----------
1912	84,361,598	177,622,626	2.11	4,131,444	1,870	80,232,000	174,030	231	2.10	485	246,216	-----------	-----------
1913	91,524,922	195,181,127	2.13	4,652,912	1,004	85,474,000	175,745	257	2.02	520	555,776	-----------	-----------
1914	90,821,507	188,181,399	2.07	4,289,873	17,696	84,041,000	179,679	245	2.06	505	916,596	-----------	-----------
1915	88,995,061	184,653,498	2.07	3,965,255	814	88,144,000	176,552	230	2.19	504	1,307,756	1,121,603	-----------
1916	87,578,493	202,009,561	2.31	4,665,530	6,000	87,118,000	159,869	253	2.16	548	1,839,506	1,987,800	-----------
1917	99,611,811	283,650,723	2.85	6,007,306	13,000	94,068,000	154,174	285	2.27	646	1,955,223	2,301,588	-----------
1918	98,826,084	336,480,347	3.40	4,967,808	37,272	92,775,000	147,121	293	2.29	672	1,857,514	2,360,183	-----------
1919	88,092,201	364,926,950	4.14	4,976,598	82,818	81,518,000	154,571	266	2.14	570	1,575,205	2,006,879	-----------
1920	89,598,249	434,252,198	4.85	5,403,749	31,748	85,786,000	145,074	271	2.28	618	938,073	2,054,441	-----------
1921	90,473,451	452,304,903	5.00	4,677,368	8,894	81,950,000	159,499	271	2.09	567	979,145	2,027,790	-----------
1922	54,683,022	273,700,125	5.01	2,649,457	233,528	56,799,000	156,849	151	2.31	349	502,793	949,745	-----------
1923	93,339,009	506,786,768	5.43	5,090,138	300,360	86,914,000	157,743	268	2.21	592	1,208,542	2,263,098	-----------
1924	87,926,862	477,230,852	5.43	4,017,785	117,951	80,717,000	160,009	274	2.00	550	1,423,884	1,865,677	-----------
1925	61,817,149	327,664,512	5.30	3,179,006	382,894	64,061,000	160,312	182	2.12	386	941,189	1,578,478	-----------
1926	84,437,452	474,164,252	5.62	4,029,683	813,956	77,221,000	165,386	244	2.09	511	931,650	2,401,356	-----------
1927	80,095,564	420,941,726	5.26	3,325,507	119,030	74,672,000	165,259	225	2.15	485	1,171,888	2,153,156	[6] 2,223,281
1928	75,348,069	393,637,690	5.22	3,336,272	384,707	73,650,000	160,681	217	2.17	469	1,289,809	2,422,924	[6] 2,351,074
1929	73,828,195	385,642,751	5.22	3,406,369	487,172	71,457,000	151,501	225	2.16	487	1,159,910	1,911,766	3,470,158

1930	69,384,837	354,574,191	5.11	2,551,659	674,812	67,628,000	150,804	208	2.21	460	1,410,128	2,536,288	4,467,750
1931	59,645,652	296,354,586	4.97	1,778,308	637,951	58,408,000	139,431	181	2.37	428	1,587,265	3,813,237	4,384,780
1932	49,855,221	222,875,129	4.46	1,303,355	607,097	50,500,000	121,243	162	2.54	411	1,674,223	3,980,973	5,433,340
1933	49,541,344	206,718,405	4.17	1,034,562	456,252	49,600,000	104,633	182	2.60	473	1,648,249	4,932,069	6,557,267
1934	57,168,291	244,152,245	4.27	1,297,610	478,118	55,500,000	109,050	207	2.53	524	1,981,088	5,798,138	9,284,486
1935	52,158,783	210,130,565	4.03	1,608,549	571,439	51,100,000	103,269	189	2.68	505	1,848,095	5,187,072	9,279,057
1936	54,579,535	227,003,538	4.16	1,678,024	614,639	53,200,000	102,081	192	2.79	535	2,162,744	6,203,267	10,827,946
1937	51,855,433	197,598,849	3.81	1,914,173	395,737	50,400,000	99,085	189	2.77	523	1,984,512	5,696,018	10,683,837
1938	46,099,027	180,600,167	3.92	1,908,911	362,895	45,200,000	96,417	171	2.79	478	1,588,407	5,095,341	10,151,669
1939	51,487,377	187,175,324	3.64	2,590,000	298,153	49,700,000	93,138	183	3.02	553	1,881,884	5,486,479	11,778,833
1940	51,484,640	205,489,814	3.99	2,667,632	135,436	49,000,000	91,313	186	3.02	562	1,816,483	6,352,700	12,326,000
1941	[8] 56,368,267	240,275,126	4.26	3,380,189	74,669	52,700,000	88,054	203	[9] 3.04	617	1,855,422	7,316,574	13,441,987
1942	[8] 60,327,729	271,673,380	4.50	4,438,588	140,115	56,500,000	82,121	239	[9] 2.95	705	2,285,640	9,070,933	14,741,459
1943	[8] 60,643,620	306,816,018	5.06	4,138,680	166,020	57,100,090	79,153	270	[9] 2.78	751	1,624,883	8,989,387	14,745,798
1944	[8] 63,701,363	354,582,884	5.57	4,185,933	11,847	59,400,000	77,591	292	[9] 2.79	815	1,336,082	10,953,030	14,975,146
1945	[8] 54,933,909	323,944,435	5.90	3,691,247	149	51,600,000	72,842	269	[9] 2.79	751	1,210,171	10,056,325	13,927,955
1946	[8] 60,506,873	413,417,070	6.83	6,497,245	9,556	53,900,000	78,145	271	[9] 2.84	770	1,232,828	12,858,930	15,619,162
1947	[8] 57,190,009	413,019,486	7.22	8,509,995	10,350	48,200,000	78,600	259	[9] 2.78	720	1,209,983	12,603,545	16,054,011
1948	[8] 57,139,948	467,051,800	8.17	6,675,914	945	50,200,000	76,215	265	[9] 2.81	745	1,016,757	13,352,874	15,742,368
1949	[8] 42,701,724	358,008,451	8.38	4,942,670	----------	37,700,000	75,377	195	[9] 2.87	560	557,599	10,376,808	11,858,088
1950	[8] 44,076,703	392,398,006	8.90	3,891,569	18,289	39,900,000	72,624	211	[9] 2.83	597	611,734	11,833,934	12,335,650
1951 [10]	42,669,997	405,817,963	9.51	5,955,535	26,812	37,000,000	68,995	208	2.97	618	496,085	11,135,990	10,847,787
1952 [10]	40,582,558	379,714,076	9.36	4,592,060	29,370	35,300,000	65,923	201	3.06	615	386,128	10,696,705	10,034,464
1953 [10]	30,949,152	299,139,687	9.67	2,724,270	31,443	28,000,000	57,862	163	3.28	535	318,699	8,606,482	6,838,769
1954 [10]	29,083,477	247,870,023	8.52	2,851,239	5,831	26,900,000	43,996	164	4.02	659	381,424	7,939,680	6,978,035

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[1] U. S. Department of Commerce.

[2] Before 1913 the figures of consumption take no account of producers' stocks, there being no data available for this item.

[3] Data first collected in 1911.

[4] Data first collected in 1915.

[5] Data first collected in 1929.

[6] As reported by the Commonwealth of Pennsylvania, Department of Mines.

[7] Calculated on basis of Pennsylvania Department of Mines employment data.

[8] Includes some "bootleg" coal purchased by authorized operators and prepared at their breakers.

[9] Output per man calculated on authorized tonnages only; bootleg purchases excluded.

[10] See footnote 1, table 1.

SCOPE OF REPORT

The data in this chapter were collected jointly by the Bureau of Mines, United States Department of the Interior, and the Bureau of the Census, United States Department of Commerce, for the Census Year 1954. The production total (29,083,477 net tons) will be compared with the Bureau of the Census total for this commodity when it is available. Differences in the totals will be explained by appropriate textual or tabular references in the Coal—Pennsylvania Anthracite chapter of Minerals Yearbook, 1955.

The Pennsylvania anthracite deposits underlie a surface area of approximately 484 square miles in the northeastern part of the State. About 181 square miles is in the Southern field, 176 in the Northern, 94 in the Western Middle, and 33 in the Eastern Middle. The coal fields are also separated into regions: The Wyoming, which extends over the same area as the Northern field; the Lehigh, which is composed of the Eastern Middle field and that portion of the Southern field east of Tamaqua; and the Schuylkill, which includes that part of the Southern field west of Tamaqua, plus the entire Western Middle field. In 1954, although fresh-mined anthracite was produced in each region and field, only seven counties—Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, and Schuylkill—contributed to the total. Berks, Lancaster, Lebanon, Northampton, and Snyder Counties produced dredge coal only in 1954. A small quantity (16,374 tons) of semianthracite mined in Sullivan County is also included. Because of this diversity of source, most of the tabular data in this chapter are presented by regions, fields, and counties.

Pennsylvania anthracite is mined or recovered at underground mines, strip pits, culm banks, and dredges. However, as anthracite is marketed only as a cleaned and sized material, the production figures reflect only those tonnages of prepared coal obtained from companies operating breakers, washeries, and dredges. A large part of the raw material processed at breakers and washeries is obtained from contractors working strip pits and culm banks and from mines not affiliated with preparation plants; therefore, these two producer categories are also canvassed annually by mail to obtain production figures on run-of-mine coal for corroboration of data supplied by the preparation plant, geographic source of output, employment, and equipment. As dredging operations are not integrated with other producing segments of the industry, the dredge operators are requested to furnish complete data on their activities to the Bureau of Mines on a separate canvass.

The primary objective of the annual canvasses of the Pennsylvania anthracite industry is to obtain accurate measurement of production. Thanks to the splendid cooperation of the producing companies, the final nonresponse rate seldom exceeds 1 or 2 percent of the total output. To insure accuracy all schedules received are first reviewed for completeness and arithmetical balance, after which schedules submitted by companies operating preparation plants are compared with reports filed by contractors, small mines, and affiliates to determine whether adequate data have been obtained on commercial production, source, and equipment. Inadequate reporting and discrepancies in reported data are resolved by correspondence or telephone. For the small part of production on which no reports are received, the Bureau of Mines prepares estimates based on statistics released by the Anthracite Committee and the Pennsylvania Department of Mines.

For many years the Pennsylvania Department of Mines, the Anthracite Committee, the Anthracite Institute, the Association of American Railroads, the Commonwealth of Massachusetts, the Ore and Coal Exchange, and others have cooperated wholeheartedly with the statistical program of the Bureau of Mines. Free use of data released by these agencies has been made. Sincere thanks are extended to each for continued and cordial cooperation.

As the procedures employed in collecting and processing data on the distribution of Pennsylvania anthracite differ widely from those outlined for production, a short discussion of the methods used will be found in the Distribution section. The short, or net, ton of 2,000 pounds is used throughout this chapter.

PRODUCTION, MINING METHODS, AND EQUIPMENT[1]

The total production of Pennsylvania anthracite from all sources, including underground mines, strip pits, culm banks, and dredges, was 29.1 million tons in 1954, a 6-percent decline from 1953. Also included is a small tonnage (16,374 tons) of semianthracite produced in the Bernice Basin of Sullivan County. Detailed data on production and shipments by type of preparation plant and by field, region, and county of origin are presented in tables 4 to 9. Tables 10 and 11 show data on shipments by sizes and regions, in percentage of total shipments. Shipments from the Lehigh, Schuylkill, and Wyoming regions for 1890–1954 are presented graphically in figure 1.

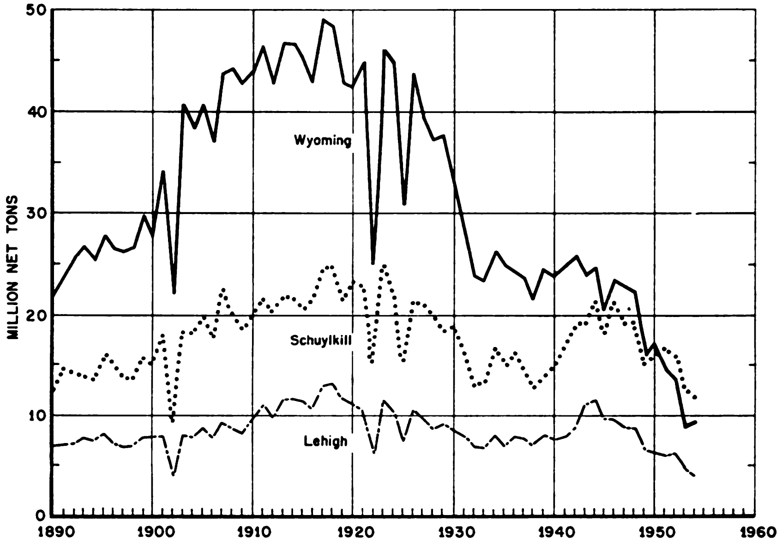

FIGURE 1.—Anthracite shipped from the Lehigh, Schuylkill, and Wyoming regions, 1890–1954.

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[1] For a more detailed description of underground mining, strip-pit, culm-bank, and dredging operations the reader is referred to the Coal—Pennsylvania Anthracite chapter of Minerals Yearbook, 1953.

TABLE 4.—Pennsylvania anthracite produced, 1950–54, by fields and types of plant, in net tons

[The figures of breaker product include a certain quantity of culm-bank coal, which amounted to 1,997,792 tons in 1954]

Field and type of plant	1950	1951 [1]	1952 [1]	1953 [1]	1954 [1]
Eastern Middle:					
Breakers	3,094,587	3,068,131	2,615,151	2,182,139	2,193,070
Washeries	195,387	243,744	330,354	359,236	321,803
Total Eastern Middle	3,289,974	3,306,875	2,945,505	2,541,375	2,514,873
Western Middle:					
Breakers	10,755,416	12,371,387	11,720,646	8,876,979	7,857,114
Washeries	----------	11,709	62,447	5,150	54,680
Dredges	197,812	122,732	62,696	46,884	83,547
Total Western Middle	10,953,228	12,505,828	11,845,789	8,929,013	7,995,341
Southern:					
Breakers	8,660,440	8,245,800	8,102,147	6,562,386	4,919,413
Washeries	439,934	556,142	876,982	790,584	1,033,202
Dredges	406,002	431,836	304,243	380,339	635,371
Total Southern	9,506,376	9,233,778	9,283,372	7,733,309	6,587,986
Northern:					
Breakers	19,930,556	17,366,517	16,318,695	11,589,838	11,803,909
Washeries	354,129	221,237	160,027	127,432	158,005
Dredges	15,750	7,000	5,115	10,958	6,989
Total Northern	20,300,435	17,594,754	16,483,837	11,728,228	11,968,903
Total, excluding Sullivan County:					
Breakers	42,440,999	41,046,835	38,756,639	29,211,342	26,773,506
Washeries	989,450	1,032,832	1,429,810	1,282,402	1,567,690
Dredges	619,564	561,568	372,054	438,181	725,907
Total, excluding Sullivan County	44,050,013	42,641,235	40,558,503	30,931,925	29,067,103
Sullivan County: [2] Breakers	26,690	28,762	24,055	17,227	16,374
Grand total	44,076,703	42,669,997	40,582,558	30,949,152	29,083,477

[1] See footnote 1, table 1.

[2] For purposes of historical comparison and statistical convenience, the mines of Sullivan County are grouped with the Pennsylvania anthracite region, although the product is classified as semianthracite according to the American Society of Testing Materials Tentative Standard.

TABLE 5.—Pennsylvania anthracite shipped outside producing region, sold locally, and used as colliery fuel in 1954, by regions and types of plant

Region and type of plant	Shipments outside region		Local sales		Colliery fuel		Total	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Lehigh:								
Breakers	3,071,232	$29,330,625	326,162	$3,556,632	79,704	$512,262	3,477,098	$33,399,519
Washeries	569,041	2,288,177	---------	---------	120	720	569,161	2,288,897
Dredges	16,015	54,189	---------	---------	---------	---------	16,015	54,189
Total Lehigh	3,656,288	31,672,991	326,162	3,556,632	79,824	512,982	4,062,274	35,742,605
Schuylkill:								
Breakers	10,234,937	84,005,029	1,186,019	9,697,629	71,543	428,488	11,492,499	94,131,146
Washeries	748,300	3,059,633	91,106	328,067	1,118	9,497	840,524	3,397,197
Dredges	631,406	1,449,786	68,254	265,153	3,243	11,195	702,903	1,726,134
Total Schuylkill	11,614,643	88,514,448	1,345,379	10,290,849	75,904	449,180	13,035,926	99,254,477
Wyoming:								
Breakers	9,261,284	91,098,064	2,090,072	19,186,265	452,553	1,820,606	11,803,909	112,104,935
Washeries	128,173	486,571	29,832	118,891	---------	---------	158,005	605,462
Dredges	6,989	29,703	---------	---------	---------	---------	6,989	29,703
Total Wyoming	9,396,446	91,614,338	2,119,904	19,305,156	452,553	1,820,606	11,968,903	112,740,100
Total, excluding Sullivan County:								
Breakers	22,567,453	204,433,718	3,602,253	32,440,526	603,800	2,761,356	26,773,506	239,635,600
Washeries	1,445,514	5,834,381	120,938	446,958	1,238	10,217	1,567,690	6,291,556
Dredges	654,410	1,533,678	68,254	265,153	3,243	11,195	725,907	1,810,026
Total	24,667,377	211,801,777	3,791,445	33,152,637	608,281	2,782,768	29,067,103	247,737,182
Sullivan County:								
Breakers	8,900	68,624	7,474	64,217	---------	---------	16,374	132,841
Grand total:								
1954	24,676,277	211,870,401	3,798,919	33,216,854	608,281	2,782,768	29,083,477	247,870,023
1953	26,616,561	260,562,089	3,711,235	35,563,560	621,356	3,014,038	30,949,152	299,139,687
Change, percent	−7.3	−18.7	+2.4	−6.6	−2.1	−7.7	−6.0	−17.1

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[1] Value given for shipments is value at which coal left possession of producing company and does not include margins of separately incorporated sales companies.

TABLE 6.—Pennsylvania anthracite produced in 1954, classified as fresh-mined, culm-bank, and river coal, and as breaker, washery, and dredge product, by regions and types of plant, in net tons

Region and type of plant	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Lehigh:						
Breakers	140,161	1,546,551	1,561,786	228,600		3,477,098
Washeries				569,161		569,161
Dredges					16,015	16,015
Total Lehigh	140,161	1,546,551	1,561,786	797,761	16,015	4,062,274
Schuylkill:						
Breakers	620,278	5,155,318	4,237,421	1,479,482		11,492,499
Washeries				840,524		840,524
Dredges					702,903	702,903
Total Schuylkill	620,278	5,155,318	4,237,421	2,320,006	702,903	13,035,926
Wyoming:						
Breakers	6,217,596	3,156,739	2,139,864	289,710		11,803,909
Washeries				158,005		158,005
Dredges					6,989	6,989
Total Wyoming	6,217,596	3,156,739	2,139,864	447,715	6,989	11,968,903
Total, excluding Sullivan County:						
Breakers	6,978,035	9,858,608	7,939,071	1,997,792		26,773,506
Washeries				1,567,690		1,567,690
Dredges					725,907	725,907
Total	6,978,035	9,858,608	7,939,071	3,565,482	725,907	29,067,103
Sullivan County: Breakers		15,765	609			16,374
Grand total	6,978,035	9,874,373	7,939,680	3,565,482	725,907	29,083,477

TABLE 7.—Pennsylvania anthracite produced in 1954, classified as fresh-mined, culm bank, and river coal, and as breaker, washery, and dredge product, by fields and types of plant, in net tons

Region and type of plant	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Eastern Middle:						
Breakers	140, 161	751, 429	1, 108, 973	192, 507	----------	2, 193, 070
Washeries	----------	----------	----------	321, 803	----------	321, 803
Total Eastern Middle	140, 161	751, 429	1, 108, 973	514, 310	----------	2, 514, 873
Western Middle:						
Breakers	301, 129	3, 341, 799	3, 050, 435	1, 163, 751	----------	7, 857, 114
Washeries	----------	----------	----------	54, 680	----------	54, 680
Dredges	----------	----------	----------	----------	83, 547	83, 547
Total Western Middle	301, 129	3, 341, 799	3, 050, 435	1, 218, 431	83, 547	7, 995, 341
Southern:						
Breakers	319, 149	2, 608. 641	1, 639, 799	351, 824	----------	4, 919, 413
Washeries	----------	----------	----------	1. 033, 202	----------	1, 033, 202
Dredges	----------	----------	----------	----------	635, 371	635, 371
Total Southern	319, 149	2, 608, 641	1, 639, 799	1, 385, 026	635, 371	6, 587, 986
Northern:						
Breakers	6, 217, 596	3, 156, 739	2. 139, 864	289, 710	----------	11, 803, 909
Washeries	----------	----------	----------	158, 005	----------	158, 005
Dredges	----------	----------	----------	----------	6, 989	6, 989
Total Northern	6, 217, 596	3, 156, 739	2, 139, 864	447, 715	6, 989	11, 968, 903
Total, excluding Sullivan County:						
Breakers	6, 978, 035	9, 858, 608	7, 939, 071	1, 997, 792	----------	26, 773, 506
Washeries	----------	----------	----------	1, 567, 690	----------	1, 567, 690
Dredges	----------	----------	----------	----------	725, 907	725, 907
Total	6, 978, 035	9, 858, 608	7, 939, 071	3, 565, 482	725, 907	29, 067, 103
Sullivan County: Breakers	----------	15, 765	609	----------	----------	16, 374
Grand total	6, 978, 035	9, 874, 373	7, 939, 680	3, 565, 482	725, 907	29, 083, 477

TABLE 8.—Pennsylvania anthracite shipped in 1954, by regions and sizes

Size	Breaker shipments [1]								
	Lehigh region			Schuylkill region			Wyoming region		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken	16,353	3	16 356	18 065	402	18.467	24.364	31,696	56,060
Egg	34 552	361	34,913	138,435	1,832	140,267	254,984	2.121	257,105
Stove	655.523	5.256	660,779	1,683,084	118,520	1,801,604	2,366.667	42,650	2.409.317
Chestnut	678 241	58,040	736,281	1,875,722	227.479	2.103 201	2,308,736	247,140	2,555,876
Pea	270,207	115.345	385,552	957,732	273.233	1,230.965	760.428	690.021	1,450,449
Buckwheat No. 1	421.819	51,186	473,005	1,449,414	181.391	1,630.805	1,199.031	357,156	1,556,187
Buckwheat No. 2 (Rice)	253.278	75,459	328.737	898.684	145,285	1,043.969	837,968	241,550	1.079,518
Buckwheat No. 3 (Barley)	295,551	19,066	314,617	1,395,101	121,694	1,516.795	948,663	251,921	1,200,584
Buckwheat No. 4	209.556	1,446	211,002	710,968	87,610	798,578	294,074	16,024	310,098
Other (including silt)	236,152		236,152	1,107,732	28,573	1,136,305	266,369	209,793	476,162
Total	3,071,232	326,162	3,397,394	10,234,937	1,186,019	11,420,956	9,261,284	2,090,072	11,351,356
VALUE									
Lump [2] and Broken	$213,393	$42	$213.435	$221,181	$5,028	$226,209	$293,801	$387,496	$681,297
Egg	442,328	5,549	447.877	1,673,841	22,767	1,696,608	3,027,965	25,972	3.053,937
Stove	8,539,105	71,550	8,610,655	20.329.893	1,329,727	21,659,620	29,112,720	577,723	29,690,443
Chestnut	8,641,592	840,557	9,482,149	21,944,774	2,579,101	24,523,875	27,806,659	3,325,198	31,181,857
Pea	2,630 979	1,318,045	3,949,024	8.492,806	2,475,525	10.968,331	7,122,118	7,485,221	14,607,839
Buckwheat No. 1	3,570.850	525,265	4,096,115	11,389,595	1,352,860	12,742.455	10,073,426	3,386,840	13,460,266
Buckwheat No. 2 (Rice)	1,914.055	661,485	2,575,540	6,143,824	950,326	7,094,150	6,137,111	1,870,871	8,007,982
Buckwheat No. 3 (Barley)	1,710,283	126.406	1,836,689	7,405,604	607,860	8 013,464	5,422,343	1,441,870	6,864,213
Buckwheat No. 4	872,671	7,733	880,404	2.677,824	296,149	2.973,973	1,221,616	72,953	1,294,569
Other (including silt)	795,369		795,369	3,725,687	78,286	3,803,973	880,305	612,121	1,492,426
Total	29,330,625	3,556,632	32,887,257	84.005,029	9,697,629	93.702,658	91,098,064	19,186,265	110,284,329
AVERAGE VALUE PER TON									
Lump [2] and Broken	$13.05	$14.00	$13.05	$12.24	$12.51	$12.25	$12.06	$12.23	$12.15
Egg	12.80	15.37	12.83	12.09	12.43	12.10	11.88	12.25	11.88
Stove	13.03	13.61	13.03	12.08	11.22	12.02	12.30	13.55	12.32
Chestnut	12.74	14.48	12.88	11.70	11.34	11.66	12.04	13.45	12.18
Pea	9.74	11.43	10.24	8.87	9.06	8.91	9.37	10.85	10.07
Buckwheat No. 1	8.47	10.26	8.66	7.86	7.46	7.81	8.40	9.48	8.65
Buckwheat No. 2 (Rice)	7.56	8.77	7.83	6.84	6.54	6.80	7.32	7.75	7.42
Buckwheat No. 3 (Barley)	5.79	6.63	5.84	5.31	4.99	5.28	5.72	5.72	5.72
Buckwheat No. 4	4.16	5.35	4.17	3.77	3.38	3.72	4.15	4.55	4.17
Other (including silt)	3.37		3.37	3.36	2.74	3.35	3.30	2.92	3.13
Total	9.55	10.90	9.68	8.21	8.18	8.20	9.84	9.18	9.72

For footnotes, see end of table.

Size	Breaker shipments [1] (Continued)								
	Sullivan County			Total					
				Excluding Sullivan County			Including Sullivan County		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken				58,782	32,101	90,883	58,782	32,101	90,883
Egg				427,971	4,314	432,285	427,971	4,314	432,285
Stove	200	200	400	4,705,274	166,426	4,871,700	4,705,474	166,626	4,872,100
Chestnut	1,980	1,880	3,860	4,862,699	532,659	5,395,358	4,864,679	534,539	5,399,218
Pea	1,647	1,790	3,437	1,988,367	1,078,599	3,066,966	1,990,014	1,080,389	3,070,403
Buckwheat No. 1	1,355	1,200	2,555	3,070,264	589,733	3,659,997	3,071,619	590,933	3,662,552
Buckwheat No. 2 (Rice)				1,989,930	462,294	2,452,224	1,989,930	462,294	2,452,224
Buckwheat No. 3 (Barley)	3,718	2,404	6,122	2,639,315	392,681	3,031,996	2,643,033	395,085	3,038,118
Buckwheat No. 4				1,214,598	105,080	1,319,678	1,214,598	105,080	1,319,678
Other (including silt)				1,610,253	238,366	1,848,619	1,610,253	238,366	1,848,619
Total	8,900	7,474	16,374	22,567,453	3,602,253	26,169,706	22,576,353	3,609,727	26,186,080
VALUE									
Lump [2] and Broken				$728,375	$392,566	$1,120,941	$728,375	$392,566	$1,120,941
Egg				5,144,134	54,288	5,198,422	5,144,134	54,288	5,198,422
Stove	$2,600	$2,600	$5,200	57,981,718	1,979,000	59,960,718	57,984,318	1,981,600	59,965,918
Chestnut	25,740	24,440	50,180	58,393,025	6,744,856	65,137,881	58,418,765	6,769,296	65,188,061
Pea	18,117	19,690	37,807	18,245,903	11,278,791	29,524,694	18,264,020	11,298,481	29,562,501
Buckwheat No. 1	10,840	9,600	20,440	25,033,871	5,264,965	30,298,836	25,044,711	5,274,565	30,319,276
Buckwheat No. 2 (Rice)				14,194,990	3,482,682	17,677,672	14,194,990	3,482,682	17,677,672
Buckwheat No. 3 (Barley)	11,327	7,887	19,214	14,538,230	2,176,136	16,714,366	14,549,557	2,184,023	16,733,580
Buckwheat No. 4				4,772,111	376,835	5,148,946	4,772,111	376,835	5,148,946
Other (including silt)				5,401,361	690,407	6,091,768	5,401,361	690,407	6,091,768
Total	68,624	64,217	132,841	204,433,718	32,440,526	236,874,244	204,502,342	32,504,743	237,007,085
AVERAGE VALUE PER TON									
Lump [2] and Broken				$12.39	$12.23	$12.33	$12.39	$12.23	$12.33
Egg				12.02	12.58	12.03	12.02	12.58	12.03
Stove	$13.00	$13.00	$13.00	12.32	11.89	12.31	12.32	11.89	12.31
Chestnut	13.00	13.00	13.00	12.01	12.66	12.07	12.01	12.66	12.07
Pea	11.00	11.00	11.00	9.18	10.46	9.63	9.18	10.46	9.63
Buckwheat No. 1	8.00	8.00	8.00	8.15	8.93	8.28	8.15	8.93	8.28
Buckwheat No. 2 (Rice)				7.13	7.53	7.21	7.13	7.53	7.21
Buckwheat No. 3 (Barley)	3.05	3.28	3.14	5.51	5.54	5.51	5.50	5.53	5.51
Buckwheat No. 4				3.93	3.59	3.90	3.93	3.59	3.90
Other (including silt)				3.35	2.90	3.30	3.35	2.90	3.30
Total	7.71	8.59	8.11	9.06	9.01	9.05	9.06	9.00	9.05

For footnotes, see end of table.

TABLE 8.—Pennsylvania anthracite shipped in 1954, by regions and sizes—Continued

Size	Washery shipments			Dredge shipments			Grand total		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken							58,782	32,101	90,883
Egg							427,971	4,314	432,285
Stove							4,705,474	166,626	4,872,100
Chestnut							4,864,679	534,539	5,399,218
Pea		815	815	261	142	403	1,990,275	1,081,346	3,071,621
Buckwheat No. 1	24,133	4,388	28,521	1,168	250	1,418	3,096,920	595,571	3,692,491
Buckwheat No. 2 (Rice)	49,757	1,016	50,773	5,086	405	5,491	2,044,773	463,715	2,508,488
Buckwheat No. 3 (Barley)	229,328	8,852	238,180	34,768	11,945	46,713	2,907,129	415,882	3,323,011
Buckwheat No. 4	498,756	45,608	544,364	56,833	20,410	77,243	1,770,187	171,098	1,941,285
Other (including silt)	643,540	60,259	703,799	556,294	35,102	591,396	2,810,087	333,727	3,143,814
Total	1,445,514	120,938	1,566,452	654,410	68,254	722,664	24,676,277	3,798,919	28,475,196
VALUE									
Lump [2] and Broken							$728,375	$392,566	$1,120,941
Egg							5,144,134	54,288	5,198,422
Stove							57,984,318	1,981,600	59,965,918
Chestnut							58,418,765	6,769,296	65,188,061
Pea		$6,520	$6,520	$2,085	$982	$3,067	18,266,105	11,305,983	29,572,088
Buckwheat No. 1	$163,895	33,869	197,764	5,498	1,125	6,623	25,214,104	5,309,559	30,523,663
Buckwheat No. 2 (Rice)	332,618	7,234	339,852	15,641	840	16,481	14,543,249	3,490,756	18,034,005
Buckwheat No. 3 (Barley)	1,184,498	43,471	1,227,969	126,455	48,926	175,381	15,860,510	2,276,420	18,136,930
Buckwheat No. 4	1,996,346	168,326	2,164,672	229,807	77,485	307,292	6,998,264	622,646	7,620,910
Other (including silt)	2,157,024	187,538	2,344,562	1,154,192	135,795	1,289,987	8,712,577	1,013,740	9,726,317
Total	5,834,381	446,958	6,281,339	1,533,678	265,153	1,798,831	211,870,401	33,216,854	245,087,255
AVERAGE VALUE PER TON									
Lump [2] and Broken							$12.39	$12.23	$12.33
Egg							12.02	12.58	12.03
Stove							12.32	11.89	12.31
Chestnut							12.01	12.66	12.07
Pea		$8.00	$8.00	$7.99	$6.92	$7.61	9.18	10.46	9.63
Buckwheat No. 1	$6.79	7.72	6.93	4.71	4.50	4.67	8.14	8.92	8.27
Buckwheat No. 2 (Rice)	6.68	7.12	6.69	3.08	2.07	3.00	7.11	7.53	7.19
Buckwheat No. 3 (Barley)	5.17	4.91	5.16	3.64	4.10	3.75	5.46	5.47	5.46
Buckwheat No. 4	4.00	3.69	3.98	4.04	3.80	3.98	3.95	3.64	3.93
Other (including silt)	3.35	3.11	3.33	2.07	3.87	2.18	3.10	3.04	3.09
Total	4.04	3.70	4.01	2.34	3.88	2.49	8.59	8.74	8.61

[1] Figures of shipments from breakers include some culm-bank coal handled in breakers.
[2] Quantity of Lump included is insignificant.

TABLE 9.—Pennsylvania anthracite produced in 1954, by counties

County	Shipments outside producing region		Sold to local trade		Colliery fuel		Total production	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Berks, Lancaster, Lebanon, Northhampton, and Snyder [2]	588, 684	$1, 263, 816	24, 801	$97, 314	--------	--------	613, 485	$1, 361, 130
Carbon	1, 357, 233	10, 811, 203	61, 141	651, 446	13, 572	$119, 855	1, 431, 946	11, 582, 504
Columbia	460, 871	4, 184, 269	22, 386	193, 561	8, 688	58, 209	491, 945	4, 436, 039
Dauphin	42, 172	203, 035	63, 713	379, 528	2	10	105, 887	582, 573
Lackawanna	2, 552, 900	24, 528, 588	744, 611	7, 977, 382	123, 233	549, 110	3, 420, 744	33, 055, 080
Luzerne	8, 398, 697	81, 967, 774	1, 586, 790	13, 688, 968	383, 256	1, 562, 940	10, 368, 743	97, 219, 682
Northumberland	3, 445, 150	26, 572, 165	438, 734	3, 729, 984	16, 778	108, 008	3, 900, 662	30, 410, 157
Schuylkill	7, 821, 670	62, 270, 927	849, 269	6, 434, 454	62, 752	384, 636	8, 733, 691	69, 090, 017
Sullivan	8, 900	68, 624	7, 474	64, 217	--------	--------	16, 374	132, 841
Total	24, 676, 277	211, 870, 401	3, 798, 919	33, 216, 854	608, 281	2, 782, 768	29, 083, 477	247, 870, 023

[1] Value given for shipments is value at which coal left possession of producing company and does not include margins of separately incorporated sales companies. [2] Counties producing dredge coal only.

TABLE 10.—Sizes of Pennsylvania anthracite shipped from breakers to points outside producing region, 1950–54, by regions, in percent of total

[Does not include shipments of dredge and washery coal]

Size	Percent of total shipments									
	Lehigh region					Schuylkill region				
	1950	1951	1952	1953	1954	1950	1951 [1]	1952 [1]	1953 [1]	1954 [1]
Lump [2] and Broken	0.4	1.0	0.3	0.4	0.5	0.2	0.4	0.2	0.1	0.2
Egg	3.6	3.7	1.9	1.3	1.1	3.5	3.6	1.9	1.5	1.4
Stove	22.0	20.1	19.9	20.0	21.4	18.1	16.2	16.6	15.6	16.4
Chestnut	22.7	22.4	21.3	21.6	22.1	22.4	19.6	19.6	17.8	18.3
Pea	7.9	7.7	7.0	8.0	8.8	7.9	8.0	7.7	8.5	9.4
Buckwheat No. 1	13.5	13.2	13.3	13.3	13.7	14.6	14.1	14.7	15.4	14.2
Buckwheat No. 2 (Rice)	7.9	8.0	7.5	8.0	8.3	8.6	8.9	9.2	9.6	8.8
Buckwheat No. 3 (Barley)	9.8	9.3	8.9	9.7	9.6	11.9	13.2	14.1	14.3	13.6
Buckwheat No. 4	6.1	7.3	8.2	8.7	6.8	6.2	7.5	7.9	8.1	6.9
Other (including silt)	6.1	7.3	11.7	9.0	7.7	6.6	8.5	8.1	9.1	10.8
Size	Wyoming region					Sullivan County				
Lump [2] and Broken	0.3	0.9	0.3	0.3	0.3	------	------	------	------	------
Egg	3.3	3.9	2.4	2.0	2.7	------	------	------	------	------
Stove	29.3	27.8	28.3	27.5	25.6	15.1	9.9	4.7	4.2	2.2
Chestnut	31.2	30.7	29.8	26.4	24.9	25.5	20.0	21.2	24.9	22.3
Pea	6.6	6.6	7.2	7.7	8.2	20.5	15.4	16.2	21.3	18.5
Buckwheat No. 1	13.3	13.0	14.5	14.1	12.9	16.4	12.5	11.6	11.5	15.2
Buckwheat No. 2 (Rice)	7.0	6.6	7.3	7.5	9.1	------	42.2	------	------	------
Buckwheat No. 3 (Barley)	6.7	7.7	7.5	8.4	10.2	------	------	------	------	41.8
Buckwheat No. 4	1.2	1.6	1.4	2.6	3.2	------	------	------	------	------
Other (including silt)	1.1	1.2	1.3	1.5	2.9	22.5	------	46.4	38.1	------
Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [2] and Broken	0.3	0.7	0.3	0.2	0.3	0.3	0.7	0.3	0.2	0.3
Egg	3.4	3.7	2.1	1.7	1.9	3.4	3.7	2.1	1.7	1.9
Stove	23.7	21.5	21.7	20.6	20.9	23.7	21.5	21.7	20.6	20.8
Chestnut	26.4	24.5	23.8	22.3	21.5	26.4	24.5	23.8	22.3	21.6
Pea	7.3	7.4	7.4	8.1	8.8	7.3	7.4	7.4	8.1	8.8
Buckwheat No. 1	13.8	13.5	14.4	14.6	13.6	13.8	13.5	14.4	14.6	13.6
Buckwheat No. 2 (Rice)	7.8	7.9	8.2	8.6	8.8	7.8	7.9	8.2	8.6	8.8
Buckwheat No. 3 (Barley)	9.3	10.3	10.7	11.3	11.7	9.3	10.3	10.7	11.3	11.7
Buckwheat No. 4	3.9	5.1	5.4	6.2	5.4	3.9	5.1	5.4	6.2	5.4
Other (including silt)	4.1	5.4	6.0	6.4	7.1	4.1	5.4	6.0	6.4	7.1

[1] See footnote 1, table 1. [2] Quantity of Lump included is insignificant.

TABLE 11.—Sizes of Pennsylvania anthracite shipped from breakers to points outside and inside producing region in 1954, by regions, in percent of total

[Does not include shipments of dredge and washery coal]

Size	Percent of total shipments								
	Lehigh region			Schuylkill region			Wyoming region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken	0.5	(2)	0.5	0.2	(2)	0.2	0.3	1.5	0.5
Egg	1.1	0.1	1.0	1.4	0.2	1.2	2.7	.1	2.3
Stove	21.4	1.6	19.5	16.4	10.0	15.8	25.6	2.1	21.2
Chestnut	22.1	17.8	21.7	18.3	19.2	18.4	24.9	11.8	22.5
Pea	8.8	35.4	11.3	9.4	23.0	10.8	8.2	33.0	12.8
Buckwheat No. 1	13.7	15.7	13.9	14.2	15.3	14.3	12.9	17.1	13.7
Buckwheat No. 2 (Rice)	8.3	23.1	9.7	8.8	12.2	9.1	9.1	11.6	9.5
Buckwheat No. 3 (Barley)	9.6	5.9	9.3	13.6	10.3	13.3	10.2	12.0	10.6
Buckwheat No. 4	6.8	.4	6.2	6.9	7.4	7.0	3.2	.8	2.7
Other (including silt)	7.7	-------	6.9	10.8	2.4	9.9	2.9	10.0	4.2

Size	Sullivan County			Total					
				Excluding Sullivan County			Including Sullivan County		
Lump [1] and Broken	--------	-------	-------	0.3	0.9	0.4	0.3	0.9	0.3
Egg	--------	-------	-------	1.9	.1	1.7	1.9	.1	1.7
Stove	2.2	2.7	2.4	20.9	4.6	18.6	20.8	4.6	18.6
Chestnut	22.3	25.2	23.6	21.5	14.8	20.6	21.6	14.8	20.6
Pea	18.5	23.9	21.0	8.8	30.0	11.7	8.8	30.0	11.7
Buckwheat No. 1	15.2	16.0	15.6	13.6	16.4	14.0	13.6	16.4	14.0
Buckwheat No. 2 (Rice)	--------	-------	-------	8.8	12.8	9.3	8.8	12.8	9.4
Buckwheat No. 3 (Barley)	41.8	32.2	37.4	11.7	10.9	11.6	11.7	10.9	11.6
Buckwheat No. 4	--------	-------	-------	5.4	2.9	5.0	5.4	2.9	5.0
Other (including silt)	--------	-------	-------	7.1	6.6	7.1	7.1	6.6	7.1

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.

Underground Operations.—Because of the suspension of operations for some months at several large underground mines in the Lehigh region, the total underground production in 1954 was over 1 million tons less than in 1953. Of the 16.9 million tons produced underground in 1954, the Lehigh region contributed only 10 percent, compared with 16 percent in 1953. Conversely, the percentage contributed by the Wyoming region increased from 52 percent of the 1953 total to 56 percent and the Schuylkill from 32 percent to 34 percent. Quantitatively also, the loss in total underground output was due entirely to the decline of approximately 1.1 million tons in the Lehigh region, since an increase exceeding 100 thousand tons in the Wyoming region more than compensated for a decline of approximately 46 thousand in the Schuylkill.

Strip-Pit Coal.—On the basis of fresh-mined tonnage only, strip coal represented 42 percent of the 1954 production in the Schuylkill region, 48 percent in the Lehigh, and 19 percent in the Wyoming, compared with 46, 38, and 18, respectively, in 1953. The sharp increase in the percentages shown for the Lehigh region was due to the abrupt decline in regional output because of work disruptions at several major underground mines rather than because of any increase

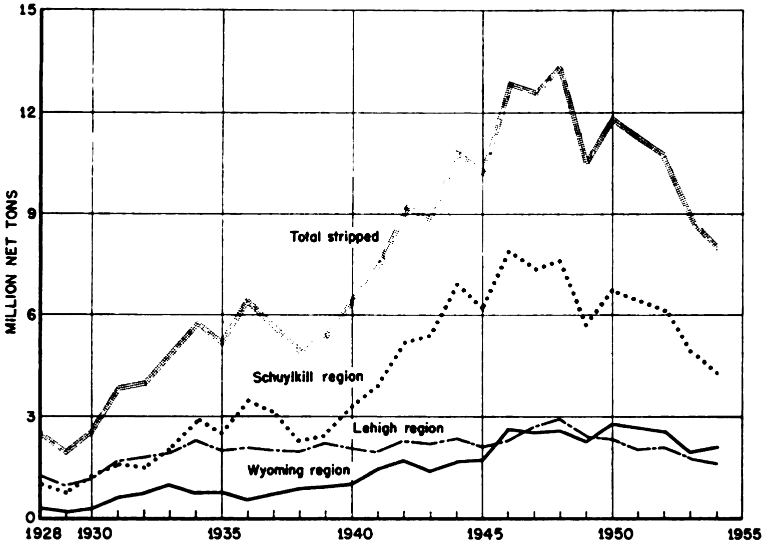

FIGURE 2.—Pennsylvania anthracite mined from strip pits, by regions, 1928–54.

in strip tonnage. In fact, the output of strip coal actually declined 171 thousand tons in the Lehigh region between 1953 and 1954. Of the 7.9 million tons produced at strip pits in 1954, 20 percent was produced in the Lehigh region, 27 percent in the Wyoming, and 53 percent in the Schuylkill, with the Wyoming the only one to show increased tonnage. Table 12 shows data on stripping operations for selected years in 1915–54 and figure 2 the trend of strip-pit production, by regions, for 1928–54.

TABLE 12.—Production of Pennsylvania anthracite from strip pits, 1915, 1920, 1925, 1930, and 1948–54

	Mined by stripping (net tons)	Percent of fresh-mined total that was stripped	Number of men employed	Average number of days worked
1915	1,121,603	(1)	(1)	(1)
1920	2,054,441	2.5	(1)	(1)
1925	1,578,478	2.7	(1)	(1)
1930	2,536,288	3.7	(1)	(1)
1948	13,352,874	26.5	7,005	260
1949	10,376,808	27.7	7,386	198
1950	11,833,934	29.6	7,949	212
1951	11,135,990	29.7	7,647	220
1952	10,696,705	30.2	7,100	212
1953	8,606,482	32.5	6,168	193
1954:				
Lehigh region	1,561,786	48.1	1,019	187
Schuylkill region	4,237,421	42.3	2,798	198
Wyoming region	2,139,864	18.6	1,017	230
Total excluding Sullivan County	7,939,071	32.0	4,834	202
Sullivan County	609	3.7	3	53
Total	7,939,680	32.0	4,837	202

[1] Data not available.

Culm-Bank Coal.—Production of Pennsylvania anthracite from culm and silt banks totaled 3.6 million tons in 1954, an 11 percent decline from 1953. The output of culm and silt banks represented 12 percent of the total production in 1954, compared with 13 percent in the preceding year. Of the total recovered from banks in 1954, 65 percent was obtained in the Schuylkill region, 22 percent in the Lehigh, and 13 percent in the Wyoming, reflecting a small tonnage increase in the Lehigh and rather sharp relative and absolute decreases in the other 2 regions. Details on the production of bank coal are shown, by regions and fields, in tables 13 and 14.

TABLE 13.—Production of Pennsylvania anthracite from culm banks, by regions, 1935–54, in net tons

Year	Lehigh	Schuylkill	Wyoming	Sullivan County	Total
1935	192,790	1,748,960	760,718		2,702,468
1936	136,058	2,532,116	525,798		3,193,972
1937	101,239	2,178,482	442,878		2,722,599
1938	53,037	1,941,896	345,511		2,340,444
1939	64,180	2,159,548	360,086		2,583,814
1940	192,878	2,109,557	480,603		2,783,038
1941	326,755	2,881,049	449,062		3,656,866
1942	745,934	3,529,757	459,373		4,735,064
1943	1,944,047	4,577,917	1,041,841	19,893	7,583,698
1944	2,125,317	5,787,036	1,673,994	13,833	9,600,180
1945	2,086,864	4,936,907	1,728,440	34,448	8,786,659
1946	1,875,590	4,752,141	1,780,874	22,487	8,431,092
1947	1,044,501	3,947,016	1,409,217	2,912	6,403,646
1948	796,114	3,729,542	1,098,123		5,623,779
1949	694,763	2,778,131	956,250		4,429,144
1950	366,069	2,533,535	565,829	1,877	3,467,310
1951	566,613	3,578,795	484,792		4,630,200
1952	791,445	3,407,974	566,097		4,765,516
1953	714,646	2,792,323	504,031		4,011,000
1954	797,761	2,320,006	447,715		3,565,482

TABLE 14.—Culm-bank coal put through breakers, 1949–54, by fields, in net tons

Year	Northern	Eastern Middle	Western Middle	Southern	Total
1949	371,787	193,565	1,366,775	1,081,585	3,013,712
1950	[1] 213,577	35,270	1,388,760	840,253	2,477,860
1951	263,555	107,064	2,526,144	700,605	3,597,368
1952	406,070	93,543	2,158,009	679,932	3,337,554
1953	376,599	146,884	1,705,773	499,342	2,728,598
1954	289,710	192,507	1,163,751	351,824	1,997,792

[1] A small quantity of culm-bank coal was put through breakers in Sullivan County.

Dredge Coal.—The production of dredge coal totaled about 726,000 tons in 1954, almost twice the output in 1953. The Susquehanna River and its tributaries provided almost all of the production, as only 16,000 tons was reported for the Lehigh River and none for the Schuylkill for the first time in many years. The abrupt increase in 1954 was attributable to the efforts of a large industrial consumer and producer to obtain a greater part of boiler-fuel requirements from lower cost sources. Increased production of river, or dredge, coal by this concern was also primarily responsible for the abrupt decline in the reported average value per ton. Details on the production of dredge coal, by rivers, are shown in tables 15 and 16.

TABLE 15.—Pennsylvania anthracite produced by dredges, in 1954, by rivers (including tributaries)

River	Production (net tons)	Value	
		Total	Average
Lehigh	16,015	$54,189	$3.38
Susquehanna	709,892	1,755,837	2.47
Total	725,907	1,810,026	2.49

TABLE 16.—Pennsylvania anthracite produced by dredges, 1909–54, by rivers (including tributaries)

Year	Net tons				Value	
	Lehigh River	Schuylkill River	Susquehanna River	Total	Total	Average per ton
1909	(1)	(1)	(1)	107,788	(1)	(1)
1910				102,853		
1911				106,005		
1912				96,009		
1913				150,064		
1914				115,257		
1915				138,421	$100,744	$0.73
1916				160,507	110,831	.69
1917				170,672	206,754	1.21
1918				282,930	366,565	1.30
1919				693,093	868,746	1.25
1920				740,453	862,296	1.16
1921				623,329	650,654	1.04
1922				904,108	989,709	1.09
Total, 1909–22 [2]	(1)	(1)	(1)	4,391,489	[2] 4,156,299	1.12
1923	106,092	97,254	753,022	956,368	811,065	.85
1924	80,301	74,359	670,734	825,394	681,181	.83
1925	99,614	173,639	742,455	1,015,708	929,292	.91
1926	58,544	131,654	724,566	914,764	828,398	.91
1927	85,177	127,705	758,935	971,817	794,807	.82
1928	89,304	157,449	696,648	943,401	821,530	.87
1929	87,241	133,720	495,983	716,944	626,187	.87
1930	60,219	138,236	444,836	643,291	538,268	.84
1931	33,014	90,855	334,881	458,750	379,682	.83
1932	42,091	105,990	331,969	480,050	445,799	.93
1933	51,083	106,004	381,837	538,924	452,153	.84
1934	91,346	100,873	459,961	652,180	636,038	.98
1935	78,578	73,326	438,563	590,467	517,304	.88
1936	63,327	31,669	451,688	546,684	581,679	1.06
1937	[3] 95,065	(3)	665,409	760,474	842,052	1.11
1938	[3] 123,452	(3)	447,572	571,024	570,579	1.00
1939	62,134	67,539	574,187	703,860	746,000	1.06
1940	[3] 78,947	(3)	863,997	942,944	1,097,000	1.16
1941	47,838	396,522	1,073,203	1,517,563	1,839,784	1.21
1942	9,385	268,919	1,006,729	1,285,033	1,478,719	1.15
1943	37,452	342,815	954,470	1,334,737	1,972,777	1.48
1944	40,894	494,371	837,472	1,372,737	2,084,431	1.52
1945	41,409	366,161	797,656	1,205,226	1,924,148	1.60
1946	37,441	247,757	847,196	1,132,394	2,091,324	1.85
1947	46,478	158,102	1,015,126	1,219,706	2,480,068	2.03
1948	54,284	67,871	865,849	988,004	2,291,752	2.32
1949	22,131	52,012	790,979	865,122	2,131,096	2.46
1950	21,877	34,222	563,465	619,564	1,677,508	2.71
1951	25,344	27,454	508,770	561,568	1,576,576	2.81
1952	17,402	30,407	324,245	372,054	1,109,778	2.98
1953	31,391	20,643	386,147	438,181	1,449,149	3.31
1954	16,015	----------	709,892	725,907	1,810,026	2.49
Total, 1923–54	1,834,870	4,117,528	20,918,442	26,870,840	38,216,150	1.42
Grand total	(1)	(1)	(1)	31,262,329	(1)	(1)

[1] Data not available.
[2] Figures for value cover 1915–22.
[3] Schuylkill included with Lehigh in 1937, 1938, and 1940.

Weekly and Monthly Data.—The Bureau of Mines regularly publishes weekly and monthly production data in a series of Weekly Anthracite Reports. The weekly data are estimated on the basis of carloading figures supplied by the Association of American Railroads, plus estimates of truck shipments, dredge coal, and colliery fuel. Monthly data in these reports include, in addition to estimates of monthly production, such related information as producer and retailer-dealer stocks, rail and truck shipments from breakers and washeries, Lake loadings and receipts, exports, imports, and price indices. Copies of these reports may be obtained by writing to the Bureau of Mines, Washington 25, D. C. The weekly and monthly data in tables 17 and 18 have been adjusted to reflect the total production figure obtained from the 1954 canvass of the producing companies.

TABLE 17.—Estimated weekly production of Pennsylvania anthracite in 1954 [1]

Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons
Jan. 2	[2] 7	Apr. 10	537	July 17	578	Oct. 23	544
9	582	17	514	24	557	30	507
16	749	24	475	31	548	Nov. 6	559
23	777	May 1	432	Aug. 7	506	13	669
30	759	8	457	14	508	20	670
Feb. 6	698	15	448	21	525	27	536
13	633	22	490	28	520	Dec. 4	654
20	625	29	610	Sept. 4	481	11	677
27	569	June 5	503	11	456	18	738
Mar. 6	436	12	591	18	571	25	649
13	523	19	605	25	668	31	[2] 549
20	547	26	646	Oct. 2	590		
27	508	July 3	68	9	561	Total	29,083
Apr. 3	499	10	372	16	602		

[1] Estimated from weekly carloadings as reported by the Association of American Railroads. Adjusted to annual production total from Bureau of Mines canvass.

[2] Figures represent output of working days in that part of week included in the calendar year 1954. Preliminary production for week of January 1, 1955, was 549,000 tons. Revised total for week of January 2, 1954, was 422,000 tons.

TABLE 18.—Estimated monthly production of Pennsylvania anthracite, 1947–54, in thousand net tons [1]

Month	1947	1948	1949	1950	1951 [2]	1952 [2]	1953 [2]	1954 [2]
January	5,172	4,929	3,725	2,893	4,316	4,221	2,707	2,874
February	4,254	4,682	2,930	2,563	3,621	3,362	2,438	2,525
March	4,984	4,935	2,375	4,847	2,244	3,140	2,354	2,364
April	4,293	4,445	3,725	3,331	2,675	3,384	2,048	2,100
May	4,564	4,874	4,407	4,228	3,723	3,400	2,869	2,013
June	4,624	4,597	3,406	4,166	3,848	3,293	2,975	2,387
July	4,098	4,372	3,925	2,855	2,847	2,522	2,551	2,080
August	5,011	5,129	3,710	4,386	3,612	2,704	2,452	2,270
September	5,158	5,015	2,114	3,835	3,267	3,761	2,732	2,416
October	5,524	4,969	4,979	4,282	4,675	4,213	2,994	2,353
November	4,629	4,687	4,657	3,355	4,129	3,405	2,386	2,681
December	4,879	4,506	2,749	3,336	3,713	3,178	2,443	3,020
Total	57,190	57,140	42,702	44,077	42,670	40,583	30,949	29,083

[1] Production is estimated from weekly carloadings as reported by the Association of American Railroads and includes mine fuel, coal sold locally, and dredge coal.

[2] See footnote 1, table 1.

Mechanical Loading.—Of the 16.9 million tons of Pennsylvania anthracite produced at underground operations in 1954, 41 percent was mechanically loaded. Although the volume of underground production dropped over 1 million tons between the 2 years, there

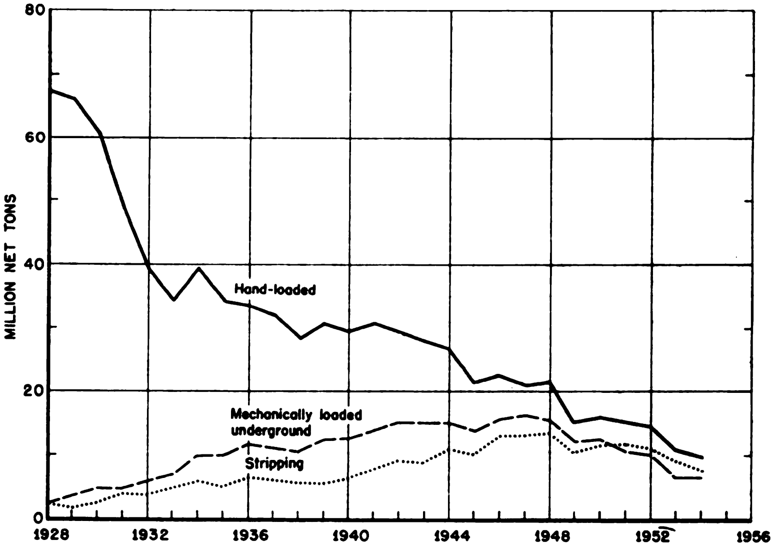

FIGURE 3.—Pennsylvania anthracite mechanically loaded, hand loaded, and stripped, 1928–54.

was a relative increase of 2 percent in mechanical loading as producing companies apparently endeavored to increase the productivity rate through greater use of available equipment. As the coal seams of the Northern field are flatter and thus more adaptable to mechanization, this field again led in mechanical loading with 89 percent of the total, followed by the Southern with 5 percent, the Western Middle with 4 percent, and the Eastern Middle with 2 percent. On a tonnage basis, the quantity mechanically loaded underground increased 8 percent in the Northern field and 1 percent in the Southern but declined 50 percent in the Eastern Middle and 36 percent in the Western Middle field because of the number and size of the underground mines closed during the year. Detailed data on underground mechanical loading are presented in tables 19 to 21. Tonnages mechanically loaded, hand loaded, and stripped are shown graphically in figure 3.

TABLE 19.—Pennsylvania anthracite loaded mechanically underground, 1953–54, by fields, in net tons

Field	Scraper loaders[1]		Pit-car loaders		Hand-loaded face conveyors, all types[2]		Total mechanically loaded	
	1943	1954	1953	1954	1953	1954	1953	1954
Northern	1, 062, 007	1, 148, 761	47, 422	27, 328	4, 663, 686	5, 041, 507	5, 773, 115	6, 217, 596
Eastern Middle	34, 032	40, 475	--------	--------	243, 625	99, 686	277, 657	140, 161
Western Middle	76, 377	113, 388	5, 030	208	389, 687	187, 533	471, 094	301, 129
Southern	56, 077	102, 629	--------	--------	260, 826	216, 520	316, 903	319, 149
Total	1, 228, 493	1, 405, 253	52, 452	27, 536	5, 557, 824	5. 545, 246	6, 838, 769	6, 978, 035

[1] Includes mobile loaders.
[2] Shaker chutes, including those equipped with duckbills.

TABLE 20.—Pennsylvania anthracite loaded mechanically underground, 1950–54

Year	Scraper loaders		Mobile loaders		Conveyors [1] and pit-car loaders		Total loaded mechanically	
	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded
1950	556	1,900,185	30	89,191	3,460	10,346,274	4,046	12,335,650
1951	528	1,693,656	43	79,032	3,282	9.075.099	3,853	10,847,787
1952	456	1,321,930	54	85,843	3,232	8,626,691	3.742	10,034,464
1953	489	1,206,241	39	22,252	2,784	5,610,276	3,312	6,838,769
1954	359	959,532	68	445,721	2,277	5,572,782	2,704	6,978,035

[1] Includes duckbills and other self-loading conveyors.

TABLE 21.—Trends in mechanical loading, hand loading, and stripping of Pennsylvania anthracite, 1927–54

[Mechanical loading includes coal handled on pit-car loaders and hand-loaded face conveyors]

Year	Fresh-mined coal							
	Underground					From strip pits		Total
	Mechanical loading (net tons)	Percent of total underground	Hand loading (net tons)	Percent of total underground	Total (net tons)	Net tons	Percent of total fresh-mined	
1927	[1] 2,223,281	3.0	71,434,537	97.0	73,657,818	2,153,156	2.8	75,810,974
1928	[1] 2,351,074	3.4	67,373,788	96.6	69,724,862	2,422,924	3.4	72,147,786
1929	3,470,158	5.0	66,493,690	95.0	69,963,848	1,911,766	2.7	71,875.614
1930	4,467,750	6.9	60,458,344	93.1	64,926,094	2,536,288	3.8	67,462,382
1931	4,384,780	8.2	49,074,722	91.8	53,459,502	3,813,237	6.7	57,272,739
1932	5,433,340	12.4	38,400.820	87.6	43,834,160	3,980,973	8.3	47,815,133
1933	6,557,267	16.0	34,474,844	84.0	41,032,111	4,932,069	10.7	45,964,180
1934	9,284,486	19.1	39,290,255	80.9	48,574,741	5,798,138	10.7	54,372,879
1935	9,279,057	21.2	34,503,819	78.8	43,782,876	5,187,072	10.6	48,969,948
1936	10,827,946	24.2	33,898,560	75.8	44,726,506	6,203,267	12.2	50,929,773
1937	10,683,837	25.1	31,882,514	74.9	42,566,351	5,696,018	11.8	48,262,369
1938	10,151,669	26.6	27,990,628	73.4	38,142,297	5,095,341	11.8	43,237,638
1939	11,773,833	27.7	30,797,715	72.3	42,571,548	5,486,479	11.4	48,058,027
1940	12,326,000	29.7	29,190,837	70.3	41,516,837	6,352,700	13.3	47,869.537
1941	13,441,987	30.6	30,435,277	69.4	43,877,264	7,316,574	14.3	51,193,838
1942	14,741,459	32.6	30,495,240	67.4	45,236,699	9,070,933	16.7	54,307,632
1943	14,745,793	34.5	27,990,005	65.5	42,735,798	8,989,387	17.4	51,725,185
1944	14,975,146	35.8	26,800,270	64.2	41,775,416	10,953,030	20.8	52,728,446
1945	13,927,955	39.9	20,957,744	60.1	34,885,699	10,056,325	22.4	44,942,024
1946	15,619,162	41.0	22,465,295	59.0	38,084,457	12,858,930	25.2	50,943,387
1947	16,054,011	43.4	20,909,101	56.6	36,963,112	12,603,545	25.4	49,566,657
1948	15,742,368	42.3	21,432,923	57.7	37,175,291	13,352,874	26.4	50,528,165
1949	11,858,088	43.9	15,172,562	56.1	27,030,650	10,376,808	27.7	37,407,458
1950	12,335,650	43.8	15,820,245	56.2	28,155,895	11,833,934	29.6	39,989,829
1951	10,847,787	41.2	15,494,452	58.8	26,342,239	11,135,990	29.7	37,478,229
1952	10,034,464	40.5	14,713,819	59.5	24,748,283	10,696,705	30.2	35,444,988
1953	6,838,769	38.2	11,054,720	61.8	17,893,489	8,606,482	32.5	26,499,971
1954	6,978,035	41.4	9,874,373	58.6	16,852,408	7,939,680	32.0	24,792,088

[1] As reported by Commonwealth of Pennsylvania, Department of Mines.

Cutting Machines.—Because of physical and mechanical difficulties in mining the steeply pitching seams in the Pennsylvania anthracite region, only a relatively small part of the underground production is machine-cut before blasting. Of the 96 machines reported used in

1954, all were employed in the Northern field, where the coal beds are comparatively flat. This number, of which 94 were of the "permissible" type (conforming to the safety standards established by the Bureau of Mines) and 2 were "nonpermissible," represented a sharp decline from the 135 reported for 1953. However, as the tonnage reported cut by machine increased 20 percent over 1953, it is apparent that in 1954 more effective use was made of the available machines.

Stripping Equipment.—The number of power shovels and draglines used in 1954 in stripping Pennsylvania anthracite increased over 1953, and the largest gain was reported for electric powered shovels. Details on the number of stripping machines in 1952–54, by types of power, are shown in table 22.

TABLE 22.—Power shovels and draglines used in stripping Pennsylvania anthracite, 1952–54, by types of power

Type of power	1952			1953			1954		
	Number of power shovels	Number of drag-lines	Total	Number of power shovels	Number of drag-lines	Total	Number of power shovels	Number of drag-lines	Total
Gasoline	51	7	58	45	7	52	43	13	56
Electric	53	57	110	54	56	110	93	79	172
Diesel	158	226	384	180	232	412	185	205	390
Steam								3	3
Total	262	290	552	279	295	574	321	300	621

PRICES AND VALUE OF SALES

According to Saward's Journal, f. o. b. mine prices quoted by the industry at the close of 1954 ranged between the following limits: Broken, $13.50–$14.10; Egg, $13.60–$14.35; Stove, $13.80–$14.60; Chestnut, $13.35–$14.10; Pea, $10.20–$11.10; Buckwheat No. 1, $9.40–$9.75; Buckwheat No. 2 (Rice), $7.80–$8.10; and Buckwheat No. 3 (Barley), $6.15–$6.25. The prices quoted were for "standard" anthracite, the specifications for which are outlined in table 23. Generally, prices at the end of 1954 were about $1.35 to $2.20 per ton less than quotations in the latter part of October 1953 on Broken through Chestnut sizes; $1.35 to $1.50 less on Pea; $0.55 to $0.75 less on Buckwheat No. 1; $0.30 to $0.40 less on Buckwheat No. 2; and zero to $0.20 more on Buckwheat No. 3. Spring discounts, which amounted to as much as $2.00 per ton on the larger sizes down to a few cents per ton on the smaller sizes, were announced by some major producers in April 1954. In some instances, it was the intention to recover the discounts by monthly increases through September. However, owing to the increased tempo of competition at the producer level because of market conditions, the prices in effect before the issuance of spring discounts were not fully restored; in fact, in a few instances those cited above were only slightly higher than those reflecting spring discounts.

TABLE 23.—Standard anthracite specifications approved and adopted by the Anthracite Committee, effective July 28, 1947

	Round test mesh, inches	Percent					
		Oversize, maximum	Undersize		Maximum impurities[1]		
			Maximum	Minimum	Slate	Bone or ash[2]	
Broken	Through 4⅜				1½	2	11
	Over 3¼ to 3		15	7½			
Egg	Through 3¼ to 3	5			1½	2	11
	Over 2 7/16		15	7½			
Stove	Through 2 7/16	7½			2	3	11
	Over 1⅝		15	7½			
Chestnut	Through 1⅝	7½			3	4	11
	Over 13/16		15	7½			
Pea	Through 13/16	10			4	5	12
	Over 9/16		15	7½			
Buckwheat No. 1	Through 9/16	10					13
	Over 5/16		15	7½			
Buckwheat No. 2 (Rice)	Through 5/16	10					13
	Over 3/16		17	7½			
Buckwheat No. 3 (Barley)	Through 3/16	10					15
	Over 3/32		20	10			
Buckwheat No. 4	Through 3/32	20					15
	Over 3/64		30	10			
Buckwheat No. 5	Through 3/64	30	No limit				16

[1] When slate content in the sizes from Broken to Chestnut, inclusive, is less than the above standards, bone content may be increased by 1½ times the decrease in the slate content under the allowable limits, but the slate content specified above shall not be exceeded in any event.

A tolerance of 1 percent is allowed on the maximum percentage of undersize and the maximum percentage of ash content.

The maximum percentage of undersize is applicable only to anthracite as it is produced at the preparation plant. Slate is defined as any material which has less than 40 percent fixed carbon.

Bone is defined as any material which has 40 percent or more, but less than 75 percent fixed carbon.

[2] Ash determinations are on a dry basis.

During the summer and fall months of 1953 companies representing the bulk of the annual production began making strenuous efforts to combat drastic price cutting. However, in view of decreased demand and the large stocks of coal held in storage by producers at the beginning of 1954, some of which was moved at distress prices, these efforts largely failed. As a result, the average received f. o. b. mine on total production decreased from $9.67 per ton in 1953 to $8.52. However, the decline was not reflected equally in all sizes as the demand and prices obtained for Buckwheat No. 2 (Rice) and smaller in recent years have been relatively firmer than for the larger coals, since the greater part of the market loss to competitive fuels has been in the space-heating field, where the larger sizes are used predominantly. For example, breaker shipments of Buckwheat No. 1 and larger size decreased 9 percent from 1953, while shipments of Buckwheat No. 2 (Rice) and smaller declined 7 percent; however, the total received for breaker shipments of Buckwheat No. 1 and larger declined 20 percent while receipts from the sale of Buckwheat No. 2 (Rice) and smaller dropped only 16 percent.

Monthly data compiled from reports published by the Bureau of Labor Statistics, United States Department of Labor, on retail prices of Pennsylvania anthracite and other fuels in selected cities are shown in table 24. For detailed information on average sales realization, see tables 25 through 27.

TABLE 24.—Retail prices of selected fuels in 1954, by months, for various cities [1]

[Coal and coke, per net ton; heating oil, per 100 gallons; gas per 25 therms]

City and fuel	January	February	March	April	May	June	July	August	September	October	November	December
Baltimore, Md.:												
Anthracite:												
Stove	$23.15	$23.15	$23.08	$22.57	$21.48	$21.48	$21.48	$21.48	$21.48	$21.74	$21.34	$21.34
Buckwheat No. 1	18.07	18.07	18.05	18.05	17.88	17.88	17.88	17.88	17.88	18.10	17.60	17.60
Heating oil: Fuel oil No. 2	13.54	13.77	13.77	13.46	13.20	13.16	13.16	13.16	13.16	13.41	13.42	14.02
Gas: Natural	4.23	4.23	4.23	4.22	4.23	4.23	4.22	4.21	4.19	4.21	4.23	4.22
Boston, Mass.:												
Anthracite:												
Stove	27.20	27.20	27.20	27.20	25.76	25.76	25.76	26.76	26.95	27.95	27.95	27.95
Buckwheat No. 1	20.55	20.55	20.55	20.55	20.11	20.11	20.11	20.61	20.80	21.30	21.30	21.30
Heating oil: Fuel oil No. 2	13.50	13.70	13.70	13.20	12.90	12.90	12.90	12.90	12.90	13.40	13.40	14.00
Gas: Manufactured	7.51	7.51	7.51	7.52	7.51	7.51	7.51	7.51	7.51	7.51	7.51	7.65
New York, N. Y.:												
Anthracite:												
Stove	25.95	25.95	25.95	25.95	23.20	23.20	23.24	23.34	23.34	23.34	23.35	23.87
Pea	19.84	19.84	19.84	19.84	18.10	18.10	18.24	18.27	18.27	18.27	18.27	18.42
Buckwheat No. 1	18.60	18.60	18.60	18.60	17.36	17.36	17.55	17.59	17.59	17.59	17.55	17.59
Heating oil: Fuel oil No. 2	14.07	14.34	13.82	13.62	13.12	13.12	13.12	13.12	13.29	13.76	13.84	14.42
Gas:												
Manufactured: Co. 1.1	5.87	5.87	5.87	5.87	5.87	5.88	5.84	5.84	5.85	5.85	5.85	5.85
Natural:												
Co. 4	6.00	5.99	5.99	5.99	5.99	5.99	5.99	5.94	5.94	5.94	5.95	5.95
Co. 5	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.67	6.67	6.67	6.64
Co. 6	6.46	6.41	6.41	6.41	6.41	6.41	6.35	6.34	6.34	6.35	6.35	6.35
Co. 12	6.71	6.71	6.76	6.71	6.74	6.78	6.78	6.78	6.81	6.83	6.78	6.78
Philadelphia, Pa.:												
Anthracite:												
Chestnut	22.98	22.98	22.98	22.98	20.15	20.49	21.33	21.50	21.41	21.41	21.66	21.83
Buckwheat No. 1	18.13	18.13	18.13	18.13	17.62	17.62	17.81	17.82	17.77	17.77	17.89	17.96
Heating oil: Fuel oil No. 2	13.23	13.33	13.33	13.03	12.83	12.73	12.62	12.83	12.83	13.13	13.13	13.76
Gas: Mixed	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	4.49
Washington, D. C.:												
Anthracite:												
Chestnut	25.36	25.36	25.36	25.36	22.72	23.33	23.94	24.26	24.57	24.99	24.99	25.19
Buckwheat No. 1	19.06	19.06	19.06	19.06	18.45	18.65	18.86	18.86	18.86	18.93	18.93	18.93
Heating oil: Fuel oil No. 2	13.92	14.18	14.18	13.95	13.57	13.57	13.57	13.57	13.57	13.87	13.87	14.48
Gas: Natural	4.07	4.07	4.07	4.07	4.07	4.07	3.81	3.85	3.88	3.86	3.86	3.88

[1] Compiled from reports of Bureau of Labor Statistics. Prices are as of the 15th of each month. Data are preliminary. Sales tax included where applicable.

TABLE 25.—Average sales realization per net ton of Pennsylvania anthracite shipped from breakers to points outside producing region, 1950–54, by regions and sizes

[Value does not include margins of separately incorporated sales companies]

Size	Lehigh region					Schuylkill region				
	1950	1951	1952	1953	1954	1950	1951 [1]	1952 [1]	1953 [1]	1954 [1]
Lump [2] and Broken	$12.27	$13.26	$13.43	$14.52	$13.05	$12.14	$13.31	$13.44	$14.12	$12.24
Egg	12.20	13.51	13.53	14.11	12.80	12.06	13.40	13.30	13.53	12.09
Stove	12.46	13.98	13.77	14.31	13.03	12.20	13.48	13.39	13.48	12.08
Chestnut	12.44	13.96	13.77	14.28	12.74	12.14	13.31	13.25	13.37	11.70
Pea	10.24	10.91	10.32	10.79	9.74	9.77	10.00	9.88	10.12	8.87
Buckwheat No. 1	6.90	7.68	8.03	9.47	8.47	6.64	7.38	7.85	9.15	7.86
Buckwheat No. 2 (Rice)	5.70	6.05	6.49	7.77	7.56	5.53	5.77	6.20	7.32	6.84
Buckwheat No. 3 (Barley)	4.50	4.75	5.01	5.56	5.79	4.37	4.58	4.81	5.25	5.31
Buckwheat No. 4	3.43	3.73	3.98	4.21	4.16	3.24	3.43	3.58	3.72	3.77
Other (including silt)	2.83	3.10	3.47	3.69	3.37	3.06	3.21	3.21	3.78	3.36
Total	9.07	9.85	9.43	10.17	9.55	8.51	8.82	8.81	9.07	8.21

Size	Wyoming region					Sullivan County				
Lump [2] and Broken	$12.10	$12.96	$13.33	$14.08	$12.06	------	------	------	------	------
Egg	12.03	13.27	13.19	13.62	11.88	------	------	------	------	------
Stove	12.21	13.79	13.63	14.07	12.30	$11.74	$12.56	$13.55	$14.27	$13.00
Chestnut	12.20	13.62	13.60	13.91	12.04	11.50	13.14	13.47	14.18	13.00
Pea	9.98	10.62	10.42	10.69	9.37	9.50	10.33	10.55	11.24	11.00
Buckwheat No. 1	6.83	7.55	8.01	9.52	8.40	6.25	7.39	7.77	9.03	8.00
Buckwheat No. 2 (Rice)	5.76	6.04	6.43	7.76	7.32	------	3.80	------	------	------
Buckwheat No. 3 (Barley)	4.58	4.89	5.05	5.67	5.72	------	------	------	------	3.05
Buckwheat No. 4	3.54	3.94	4.20	4.76	4.15	------	------	------	------	------
Other (including silt)	2.72	3.00	3.07	3.59	3.30	4.00	------	3.81	4.27	------
Total	10.17	11.20	11.12	11.53	9.84	8.58	7.99	7.86	9.19	7.71

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [2] and Broken	$12.15	$13.12	$13.39	$14.21	$12.39	$12.15	$13.12	$13.39	$14.21	$12.39
Egg	12.07	13.36	13.29	13.65	12.02	12.07	13.36	13.29	13.65	12.02
Stove	12.25	13.72	13.57	13.90	12.32	12.25	13.72	13.57	13.90	12.32
Chestnut	12.21	13.56	13.49	13.77	12.01	12.21	13.56	13.49	13.77	12.01
Pea	9.94	10.38	10.16	10.43	9.18	9.94	10.38	10.16	10.43	9.18
Buckwheat No. 1	6.76	7.49	7.94	9.33	8.15	6.76	7.49	7.94	9.33	8.15
Buckwheat No. 2 (Rice)	5.65	5.91	6.33	7.53	7.13	5.65	5.90	6.33	7.53	7.13
Buckwheat No. 3 (Barley)	4.46	4.69	4.91	5.41	5.51	4.46	4.69	4.91	5.41	5.50
Buckwheat No. 4	3.33	3.56	3.74	3.99	3.93	3.33	3.56	3.74	3.99	3.93
Other (including silt)	2.96	3.17	3.28	3.74	3.35	2.97	3.17	3.29	3.74	3.35
Total	9.34	9.94	9.81	10.15	9.06	9.34	9.94	9.81	10.15	9.06

[1] See footnote 1, table 1.
[2] Quantity of Lump included is insignifica

TABLE 26.—Average sales realization per net ton of Pennsylvania anthracite shipped from breakers to points outside and inside producing region in 1954, by regions and sizes

[Value does not include margins of separately incorporated sales companies]

Size	Lehigh region			Schuylkill region			Wyoming region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken	$13.05	$14.00	$13.05	$12.24	$12.51	$12.25	$12.06	$12.23	$12.15
Egg	12.80	15.37	12.83	12.09	12.43	12.10	11.88	12.25	11.88
Stove	13.03	13.61	13.03	12.08	11.22	12.02	12.30	13.55	12.32
Chestnut	12.74	14.48	12.88	11.70	11.34	11.66	12.04	13.45	12.18
Pea	9.74	11.43	10.24	8.87	9.06	8.91	9.37	10.85	10.07
Buckwheat No. 1	8.47	10.26	8.66	7.86	7.46	7.81	8.40	9.48	8.65
Buckwheat No. 2 (Rice)	7.56	8.77	7.83	6.84	6.54	6.80	7.32	7.75	7.42
Buckwheat No. 3 (Barley)	5.79	6.63	5.84	5.31	4.99	5.28	5.72	5.72	5.72
Buckwheat No. 4	4.16	5.35	4.17	3.77	3.38	3.72	4.15	4.55	4.17
Other (including silt)	3.37	-------	3.37	3.36	2.74	3.35	3.30	2.92	3.13
Total	9.55	10.90	9.68	8.21	8.18	8.20	9.84	9.18	9.72

Size	Sullivan County			Total					
				Excluding Sullivan County			Including Sullivan County		
Lump [1] and Broken	-------	-------	-------	$12.39	$12.23	$12.33	$12.39	$12.23	$12.33
Egg	-------	-------	-------	12.02	12.58	12.03	12.02	12.58	12.03
Stove	$13.00	$13.00	$13.00	12.32	11.89	12.31	12.32	11.89	12.31
Chestnut	13.00	13.00	13.00	12.01	12.66	12.07	12.01	12.66	12.07
Pea	11.00	11.00	11.00	9.18	10.46	9.63	9.18	10.46	9.63
Buckwheat No. 1	8.00	8.00	8.00	8.15	8.93	8.28	8.15	8.93	8.28
Buckwheat No. 2 (Rice)	-------	-------	-------	7.13	7.53	7.21	7.13	7.53	7.21
Buckwheat No. 3 (Barley)	3.05	3.28	3.14	5.51	5.54	5.51	5.50	5.53	5.51
Buckwheat No. 4	-------	-------	-------	3.93	3.59	3.90	3.93	3.59	3.90
Other (including silt)	-------	-------	-------	3.35	2.90	3.30	3.35	2.90	3.30
Total	7.71	8.59	8.11	9.06	9.01	9.05	9.06	9.00	9.05

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[1] Quantity of Lump included is insignificant.

TABLE 27.—Average value per net ton of Pennsylvania anthracite from all sources 1953–54, by regions [1]

[Data include washery and dredge coal]

Region	1953 [2]				1954 [2]			
	Shipped outside region	Local sales	Colliery fuel	Total production	Shipped outside region	Local sales	Colliery fuel	Total production
Lehigh	$9.66	$11.28	$7.67	$9.73	$8.66	$10.90	$6.43	$8.80
Schuylkill	8.66	8.13	3.84	8.58	7.02	7.65	5.92	7.61
Wyoming	11.42	10.08	4.43	10.93	9.75	9.11	4.02	9.42
Total, excluding Sullivan County	9.79	9.58	4.85	9.67	8.59	8.74	4.57	8.52
Sullivan County	9.19	8.86		9.09	7.71	8.59		8.11
Grand total	9.79	9.58	4.85	9.67	8.59	8.74	4.57	8.52

[1] Value given for shipments is value at which coal left possession of producing company and does not include margins of separately incorporated sales companies.

[2] See footnote 1, table 1.

EMPLOYMENT

Because of such variables as the number of days worked, changes in mining methods, shifts to sources with higher output rates, etc., fluctuations in production of Pennsylvania anthracite have not always been accompanied by immediate or comparable variations in employment. Such was the case in 1954. For example, the average number of men working daily totaled 43,996, a decline of 24 percent from the 1953 work force, yet production declined only 6 percent between the 2 years. The result, of course, was a sharp improvement in output per man-day. The rate of 4.02 tons per man-day in 1954 not only far surpassed the 3.28 figure for 1953 but marked the first time in the history of the industry that the productivity rate exceeded 4 tons. Relatively higher rates of output at underground operations and strip pits were primarily responsible for the substantial increase.

In 1954, of the total labor force 62 percent was employed underground, 11 percent at strip pits, and 27 percent at culm banks, preparation plants, and other surface installations. Although these percentages indicate a relative decrease of only 2 percent in the underground force and a similar increase in surface employment, there was an actual decline of 27 percent between 1953 and 1954 in the number of men working daily underground, 22 percent at strip pits, and 18 percent at other surface facilities. Of the 1954 total labor force, 46 percent were employed in the Wyoming region, 38 percent in the Schuylkill, and 16 percent in the Lehigh. 1954 was marked by the closing of many mining operations, but the most severe from the standpoint of employment occurred in the Lehigh region, where one of the oldest and largest producing companies withdrew from mining activities. Over 4,000 men were idled in the spring, most of whom were employed in the Coaldale-Panther Valley area, and it was not until late fall that mining was resumed. However, the two new companies formed to operate part of the properties on lease had reemployed only slightly more than one-third of the original company's labor force by the end of the year.

Detailed statistics are presented in tables 28 and 29.

TABLE 28.—Men employed and days worked at operations producing Pennsylvania anthracite in 1954, by regions and types of plant

[Includes operations of strip contractors]

Region and type of plant	Average number of men working daily								Average number of days plant operated	Man-days of labor	Average tons per man per day
	Underground			Surface				Grand total			
	Miners and their laborers	Other	Total underground	In strip pits	In preparation plants	Other	Total surface				
Lehigh:											
Breaker	2,356	1,858	4,214	1,019	934	778	2,731	6,945	122	849,469	4.09
Washery [1]	------	------	------	------	66	64	130	130	210	27,279	20.86
Dredge	------	------	------	------	2	6	8	8	207	1,656	9.67
Total Lehigh	2,356	1,858	4,214	1,019	1,002	848	2,869	7,083	124	878,404	4.62
Schuylkill:											
Breaker	5,693	2,511	8,204	2,798	2,437	2,941	8,176	16,380	169	2,765,575	4.16
Washery [1]	------	------	------	------	165	169	334	334	206	68,670	12.24
Dredge	------	------	------	------	66	123	189	189	210	39,783	17.67
Total Schuylkill	5,693	2,511	8,204	2,798	2,668	3,233	8,699	16,903	170	2,874,028	4.54
Wyoming:											
Breaker	9,934	4,906	14,840	1,017	1,270	2,750	5,037	19,877	174	3,460,839	3.41
Washery [1]	------	------	------	------	24	51	75	75	200	14,974	10.55
Dredge	------	------	------	------	3	4	7	7	200	1,400	4.99
Total Wyoming	9,934	4,906	14,840	1,017	1,297	2,805	5,119	19,959	174	3,477,213	3.44
Total, excluding Sullivan County:											
Breaker	17,983	9,275	27,258	4,834	4,641	6,469	15,944	43,202	164	7,075,883	3.78
Washery [1]	------	------	------	------	255	284	539	539	206	110,923	14.13
Dredge	------	------	------	------	71	133	204	204	210	42,839	16.95
Total	17,983	9,275	27,258	4,834	4,967	6,886	16,687	43,945	165	7,229,645	4.02
Sullivan County: Breaker	24	12	36	3	8	4	15	51	129	6,584	2.49
Grand total	18,007	9,287	27,294	4,837	4,975	6,890	16,702	43,996	164	7,236,229	4.02

[1] Represents washeries for which production and employment were separately reported.

TABLE 29.—Men employed at operations producing Pennsylvania anthracite, 1953–54,[1] by counties

[Includes operations of strip contractors]

County	1953	1954	County	1953	1954
Berks, Lancaster, Lebanon, Northampton, and Snyder [2]	82	118	Luzerne	23,217	15,649
Carbon	3,037	2,336	Northumberland	6,301	4,431
Columbia	1,192	903	Schuylkill	15,996	13,722
Dauphin	490	199	Sullivan	46	51
Lackawanna	7,501	6,587	Total	57,862	43,996

[1] See footnote 1, table 1.

[2] Counties producing dredge coal only.

Although the data published by the Department of Mines, Commonwealth of Pennsylvania, on the number of men affected by mines closing and opening cannot be correlated with Bureau data on employment because of differences in methods of computation, it is interesting to note that, in 1954, 79 mines were reported closed as compared with 72 in the previous year. However, whereas closures in 1953 resulted in the unemployment of 6,544, the number reached 14,045 in 1954. After allowing for the number of men employed at new mines and by the reopening of old operations, the State figures indicate a net loss of approximately 6,000 in the mine labor force in 1953 and 10,000 in 1954.

For the past few years anthracite producers have been confronted with increasingly complex economic and technical problems. In the face of a declining market, due primarily to the inroads made by competitive fuels, the industry has been forced to adjust its active productive capacity to a level more commensurate with demand and, at the same time, to reduce mining costs to meet competition. A study of financial reports of several major producers for 1954 indicates that, although material improvement was made in lowering production costs, the unstable price situation resulted in an unprofitable year for the industry. Measures taken by the industry in 1954 to reduce productive capacity and costs were aimed at curtailing or abandoning operations at high-cost mines, revising work schedules, and obtaining greater percentages of the total ouptut from surface sources. That these measures were successful is evidenced by the improved productivity rate; yet their success, as indicated by the foregoing statistics on employment, spelled unemployment for many mine workers and further aggravation of the serious unemployment problem that has plagued the anthracite-producing region for years.

DISTRIBUTION

The Bureau of Mines has collected and published data on the distribution of Pennsylvania anthracite since the 1942–43 coal year (April 1–March 31). The data are collected on rail shipments to approximately 356 cities in 20 States and Canadian Provinces and on truck shipments by States of destination only. In contrast to the regular production statistics presented in this chapter, which are obtained by canvassing the producing companies only, the distribution data are supplied by American and Canadian wholesalers and dock operators as well as producers. This method, which permits crosschecking all returns, is believed to be the most accurate yet devised for tracing shipments from the mines to points of final destination whether moving all rail, rail-tidewater, rail-lake, or ex-dock-rail. Results of the canvasses on distribution are published by the Bureau as mineral market reports. Copies may be obtained free by writing to the United States Department of the Interior, Bureau of Mines, Washington 25, D. C.

Owing to the increased volume of work involved in collecting and processing 1954 production data jointly with the Bureau of the Census, United States Department of Commerce, considerable time elapsed between publication of the Minerals Yearbook 1953 and this chapter. During this interim the Bureau of Mines released Mineral Market Reports 2338 and 2451, covering the distribution of Pennsylvania anthracite for the 1953–54 and 1954–55 coal years, respectively. Shipments for each of the coal years, by States, Provinces, and countries of destination and by size of coal shipped, are summarized in tables 30 and 31.

Shipments reported to the Bureau of Mines totaled 26,620,549 net tons for the 1954–55 coal year, 8 percent less than in the 1953–54 coal year, and 21 percent less than reported for the 1952–53 year. Of the 1954–55 coal-year total, 89 percent was shipped to points in the United States, 9 percent to Canada, and 2 percent to all other countries. On a tonnage basis, 1954–55 coal-year shipments to Canada and the United States were approximately 10 percent less than in 1953–54, while exports to all other countries increased from 68,000 tons to 463,000 tons. A continuation of above-normal winter temperatures and the availability of competing fuels in Canada and the United States were undoubtedly responsible for the greater part of the decline in both countries.

Reversing the trend of recent years, the larger sizes were in relatively stronger demand in the 1954–55 coal year than the smaller sizes. For example, shipments of Pea and larger to American and Canadian destinations combined were only 8 percent less than in the preceding coal year, as contrasted with declines of 11 and 21 percent, respectively, in shipments of Buckwheat No. 1 and smaller.

The steady increase in the percentage of anthracite shipped from the mines by truck continued during the 1954–55 coal year. Despite the decline in production the total shipped by truck climbed from 6,475,000 net tons in the 1953–54 coal year to 7,075,000 tons, an increase of 9 percent. As recently as the 1951–52 coal year, truck shipments composed only 18 percent of total shipments, yet the total indicated above for the 1954–55 coal year represented 27 percent of the total for the year. The rapid decline in the percentage of anthracite shipped by rail may well indicate that high freight rates have expanded the economic radius of the trucking area. Significantly, truck shipments to New York during the 1954–55 coal year were 26 percent higher than in 1953–54, while shipments to New Jersey increased 19 percent, Maryland 68 percent, and Pennsylvania points outside the "local sales" area 13 percent.

Data compiled monthly by the Pennsylvania Department of Mines also reflect this trend. For the year 1954, according to this source, rail shipments totaled approximately 19 million tons—13 percent less than in 1953—while truck shipments made an overall gain of 8 percent. Significantly, all of the States that are located within economical trucking distance of the mines and showed a decline in rail receipts during 1954 registered increases in trucked coal. For instance, New York, with an 18-percent decline in rail tonnage, increased truck tonnages 17 percent; New Jersey, with a 9-percent decline in rail tonnage, increased trucking volume 19 percent; and Maryland, which experienced a 14-percent decline in rail shipments, stepped up 1954 receipts of trucked coal 66 percent. See tables 32 and 33.

TABLE 30.—Distribution of Pennsylvania anthracite, April 1, 1953, to March 31, 1954, by States, Provinces, and countries of destination, in net tons

Destinations	Domestic sizes						Steam sizes					Total all sizes	Percent of total
	Broken	Egg	Stove	Chestnut	Pea	Total domestic	Buckwheat No. 1	Buckwheat No. 2 (Rice)	Buckwheat No. 3 (Barley)	All other sizes	Total steam		
United States													
New England States:													
Connecticut	111	4,174	147,287	170,832	15,561	337,965	33,606	30,114	13,544	256	77,520	415,485	1.43
Maine		9,532	65,600	56,347	2,020	133,499	9,212	10,107		2,069	21,388	154,887	.53
Massachusetts	967	72,055	549,800	264,816	21,852	909,490	81,324	64,067	29,988	16,485	191,864	1,101,354	3.79
New Hampshire		4,758	50,980	33,879	2,205	91,822	17,480	13,197	48,696	2,420	81,793	173,615	60
Rhode Island		5,773	65,068	41,177	3,311	115,329	14,202	7,936		2,972	25,110	140,439	.48
Vermont	396	2,991	60,715	39,284	5,433	108,819	27,678	21,682	6,047	148	55,555	164,374	.57
Total	1,474	99,283	939,450	606,335	50,382	1,696,924	183,502	147,103	98,275	24,350	453,230	2,150,154	7.40
Middle Atlantic States:													
New Jersey	6,593	18,760	394,419	969,300	281,498	1,670,570	394,601	349,365	836,563	559,521	2,140,050	3,810,620	13.11
New York	9,653	178,063	1,689.803	1,465,109	947,312	4,289,940	1,748,165	656,393	690,788	943,394	4,038,740	8,328,680	28.67
Pennsylvania [1]	65,854	39,817	579,130	1,548,357	1,569,782	3,802,940	1,068,437	1,061,202	1,741,570	2,667,961	6,539,170	10,342,110	35.60
Total	82,100	236,640	2,663,352	3,982,766	2,798,592	9,763,450	3,211,203	2,066,960	3,268,921	4,170,876	12,717,960	22,481,410	77.38
South Atlantic States: [2]													
Delaware	3,679	2,211	32,667	115,782	7,390	161,729	6,552	8,084	25,709	2,707	43,052	204,781	.71
District of Columbia		4,060	30,231	43,252	5,112	82,655	15,835	1,248		12	17,095	99,750	.34
Maryland	1,380	8,537	99,214	114,263	25,145	248,539	51,806	8,670	5,761	43,060	109,297	357,836	1.23
Viriginia		835	16,597	22,040	5,432	44,904	22,604	158	122	544	23,428	68,332	.24
Total	5,059	15,643	178,709	295,337	43,079	537,827	96,797	18,160	31,592	46,323	192,872	730,699	2.52
Lake States: [3]													
Illinois	2,310	2,699	13,490	28,117	1,796	48,412	22,523	15,190	11,075	24,743	73,531	121,943	.42
Michigan		5,047	54,619	31,862	764	92,292	5,963	7,394		38,048	51,405	143,697	.49
Minnesota		31	3,175	5,633	425	9,264	362	4,776	792	64,394	70,324	79,588	.27
Ohio		1,996	2,364	17,253	924	22,537	13,724	14,514	3,015	26,330	57,583	80,120	.28
Wisconsin		168	77,540	105,986	11,079	194,773	9,189	3,758		88,846	101,793	296,566	1.02
Total	2,310	9,941	151,188	188,851	14,988	367,278	51,761	45,632	14,882	242,361	354,636	721,914	2.48
All other States	3,360	799	3,846	38,146	3,899	50,050	13,974	3,458	672	119,491	137,595	187,645	.65
Total United States	94,303	362,306	3,936,545	5,111,435	2,910,940	12,415,529	3,557,237	2,281,313	3,414,342	4,603,401	13,856,293	26,271,822	90.43

Canada:													
Ontario	--------	29,055	1,062,850	712,961	65,474	1,870,340	76,393	59,158	3,400	9,267	148,218	2,018,558	6.95
Quebec	53	11,962	194,300	103,885	11,151	321,351	112,199	118,795	100,984	447	341,425	662,776	2.28
Other Provinces	450	3,313	11,086	10,802	47	25,698	463	3,453	----------	1,028	4,944	30,642	.11
Total Canada	503	44,330	1,268,236	827,648	76,672	2,217,389	189,055	181,406	113,384	10,742	494,587	2,711,976	9.34
Other countries	--------	10,950	7,757	7,957	10,935	37,599	8,297	22,157	----------	----------	30,454	68,053	.23
Grand total	94,806	417,586	5,212,538	5,947,040	2,998,547	14,670,517	3,754,589	2,484,876	3,527,726	4,614,143	14,381,334	29,051,851	100.00

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[1] Includes "Local sales."

[2] Shipments to other states generally referred to as being in the South Atlantic area are included in "All other States."

[3] Shipments to Indiana are included in "All other States."

TABLE 31.—Distribution of Pennsylvania anthracite, April 1, 1954, to March 31, 1955, by States, Provinces, and countries of destination, in net tons

Destinations	Pea and larger						Buckwheat No. 1 and smaller					Total all sizes	Percent of total
	Broken	Egg	Stove	Chestnut	Pea	Total	Buck-wheat No. 1	Buck-wheat No. 2 (Rice)	Buck-wheat No. 3 (Barley)	All other sizes	Total		
United States													
New England States:													
Connecticut	--------	3, 539	119, 168	136, 952	12, 905	272, 564	25, 598	17, 894	20, 741	1, 161	65, 394	337, 958	1. 27
Maine	--------	6, 252	64, 427	56, 812	1, 866	129, 357	8, 129	9, 189	52	1, 559	18, 929	148, 286	. 56
Massachusetts	633	58, 407	486, 743	228, 606	18, 663	793, 052	64, 642	59, 528	25, 408	12, 024	161, 602	954, 654	3. 58
New Hampshire	--------	4, 051	48, 171	29, 735	1, 962	83, 919	11, 758	13, 269	64, 201	1, 585	90, 813	174, 732	. 66
Rhode Island	--------	2, 765	51, 340	33, 575	2, 363	90, 043	8, 027	6, 041	--------	281	14, 349	104. 392	. 39
Vermont	206	2, 771	58, 400	37, 133	5, 848	104, 358	24, 754	21. 812	652	127	47. 345	151, 703	. 57
Total	839	77, 785	828, 249	522, 813	43, 607	1, 473, 293	142, 908	127, 733	111. 054	16, 737	398, 432	1, 871, 725	7. 03
Middle Atlantic States:													
New Jersey	5, 722	15, 437	346, 983	827. 665	261, 209	1, 457, 016	379, 645	339, 007	736, 262	628, 316	2, 083, 230	3, 540, 246	13. 30
New York	3, 129	143, 263	1. 445, 304	1, 248, 584	849, 919	3, 690, 199	1, 417, 842	564. 906	535, 877	734, 773	3, 253. 398	6, 943, 597	26. 08
Pennsylvania [1]	58, 320	36, 818	658, 945	1, 623, 404	1, 522, 223	3, 899, 710	1, 075, 840	1, 024, 724	1, 545, 798	2, 264, 252	5. 910, 614	9, 810, 324	36. 85
Total	67, 171	195, 518	2, 451, 232	3, 699, 653	2, 633, 351	9, 046, 925	2, 873, 327	1, 928, 637	2, 817, 937	3, 627, 341	11, 247, 242	20, 294, 167	76. 23
South Atlantic States: [2]													
Delaware	2, 871	1, 538	31, 521	88, 836	5, 335	130, 101	5, 022	3, 505	16, 574	--------	25, 101	155, 202	. 58
District of Columbia	--------	3, 511	24, 532	36, 778	4, 003	68, 824	18, 118	1, 179	708	--------	20, 005	88, 829	. 33
Maryland	1, 396	6, 344	94, 987	100, 356	27, 495	230, 578	30, 654	9, 094	840	68, 785	109, 373	339, 951	1. 28
Virginia	--------	737	18, 128	22, 207	3, 179	44, 251	22, 808	79	--------	537	23, 424	67, 675	. 26
Total	4, 267	12, 130	169, 168	248, 177	40, 012	473, 754	76, 602	13, 857	18, 122	69, 322	177, 903	651, 657	2. 45
Lake States: [3]													
Illinois	1, 248	3, 198	11, 583	26, 128	3, 797	45, 954	18, 638	12, 454	8, 097	20, 580	59, 769	105, 723	. 40
Michigan	--------	3, 429	46, 812	27, 580	1, 249	79, 070	5, 359	7, 581	--------	25, 730	38, 670	117, 740	. 44
Minnesota	--------	108	2, 381	3, 955	228	6, 672	--------	1, 203	366	18, 504	20, 073	26, 745	. 10
Ohio	--------	1, 416	2, 137	13, 790	775	18, 118	13, 942	20, 400	3, 279	58, 388	96, 009	114, 127	. 43
Wisconsin	--------	44	67, 305	102, 917	8, 976	179, 242	8, 050	4, 716	--------	85, 412	98, 178	277, 420	1. 04
Total	1, 248	8, 195	130. 218	174, 370	15, 025	329, 056	45, 989	46, 354	11, 742	208, 614	312, 699	641, 755	2. 41
All other States	3, 385	1, 350	6, 193	53, 225	31, 204	95, 357	27, 694	18, 658	10, 104	116, 919	173, 375	268, 732	1. 01
Total United States	76, 910	294, 978	3, 585, 060	4, 698, 238	2, 763, 199	11, 418, 385	3, 166, 520	2, 135, 239	2. 968, 959	4, 038, 933	12, 309, 651	23, 728, 036	89. 13

Canada.													
Ontario	....	32, 365	962, 141	637, 562	58, 452	1, 690, 520	57, 735	59, 359	2, 884	2, 044	122, 022	1, 812, 542	6. 81
Quebec	....	9, 815	194, 221	107, 612	13, 436	325, 084	79, 384	123, 676	62, 196	1, 321	266, 577	591, 661	2. 22
Other Provinces	539	3, 609	10, 695	8, 482	....	23, 325	585	953	....	39	1, 577	24, 902	. 10
Total Canada	539	45, 789	1, 167, 057	753, 656	71, 888	2, 038, 929	137, 704	183, 988	65, 080	3, 404	390, 176	2, 429, 105	9. 13
Other countries	....	9, 303	31, 351	143, 135	106, 337	290, 126	56, 205	29, 872	....	87, 205	173. 282	463, 408	1. 74
Grand total	77. 449	350, 070	4, 783, 468	5, 595. 029	2, 941, 424	13, 747, 440	3, 360, 429	2, 349, 099	3, 034, 039	4, 129, 542	12, 873, 109	26, 620, 549	100. 00

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[1] Includes "Local sales."
[2] Shipments to other states generally referred to as being in the South Atlantic area are included in "All other States."
[3] Shipments to Indiana are included in "All other States."

TABLE 32.—Rail shipments of Pennsylvania anthracite, 1951–54, by destinations, in net tons [1]

[Pennsylvania Department of Mines]

Destination	1951	1952	1953	1954
New England States	2, 955, 785	2, 725, 609	2, 067, 189	1, 809, 622
New York	9, 095, 169	8, 889, 094	6, 889, 624	5, 646, 750
New Jersey	4, 140, 095	3, 927, 830	3, 487, 560	3, 169, 972
Pennsylvania	6, 026, 258	6, 260, 242	5, 846, 542	4, 999, 277
Delaware	222, 750	200, 389	184, 665	152, 644
Maryland	397, 129	358, 567	290, 852	250, 372
District of Columbia	135, 742	123, 322	101, 911	87, 690
Virginia	75, 982	71, 820	66, 482	56, 663
Ohio	85, 303	118, 378	97, 346	118, 520
Indiana	58, 155	47, 206	30, 969	29, 545
Illinois	207, 291	143, 085	107, 618	96, 928
Wisconsin	355, 852	275, 058	155, 481	161, 271
Minnesota	28, 340	34, 295	25, 052	11, 646
Michigan	171, 315	138, 440	93, 024	80, 566
Other States	144, 861	144, 762	160, 971	156, 176
Total United States	24, 100, 027	23, 458, 097	19, 605, 286	16, 827, 642
Canada	3, 199, 775	3, 175, 125	2, 541, 269	2, 271, 981
Other foreign countries	1, 724, 439	667, 213	73, 206	250, 808
Grand total	29, 024, 241	27, 300, 435	22, 219, 761	19, 350, 431

[1] Does not include dredge coal.

TABLE 33.—Truck shipments of Pennsylvania anthracite in 1954, by months and by States of destination, in net tons [1]

Destination	January	February	March	April	May	June	July
Pennsylvania:							
Within region	471, 240	380, 786	374, 476	378, 949	302, 057	193, 480	171, 584
Outside region	213, 462	181, 301	183, 427	160, 629	164, 350	116, 670	122, 605
New York	74, 351	65, 770	68, 197	59, 651	52. 185	46. 058	49, 413
New Jersey	55, 348	50, 546	43, 915	36, 057	40, 618	34, 185	38. 850
Delaware	2, 286	5, 794	741	732	829	321	398
Maryland	9. 449	7, 161	5, 682	2, 922	2, 140	3, 093	3. 185
District of Columbia	134	152	129	39	82	65	277
Other States	1, 333	1, 125	2, 364	1, 772	466	169	1, 878
Total: 1954	827. 603	692, 635	678. 931	640. 751	562, 727	394, 041	388, 190
1953	629. 049	588, 480	525, 894	520, 765	553. 854	510, 173	422, 244

Destination	August	September	October	November	December	Total	Percent of total trucked
Pennsylvania:							
Within region	207, 359	244, 042	262. 130	346. 073	487, 390	3, 819, 566	52. 4
Outside region	140, 274	180, 338	162, 188	210. 227	223, 622	2, 059, 093	28. 3
New York	51, 143	61, 453	53, 980	61, 440	70, 291	713, 932	9. 8
New Jersey	41, 394	53, 537	54, 700	56, 276	67. 267	572, 693	7. 9
Delaware	436	803	851	1, 246	1, 702	16. 139	. 2
Maryland	5, 379	6, 682	6. 504	6, 609	10, 688	69, 494	1. 0
District of Columbia	223	324	514	360	623	2, 922	([2])
Other States	384	1, 403	5, 463	6, 464	7, 413	30, 234	. 4
Total: 1954	446, 592	548. 582	546. 330	688, 695	868, 996	7, 284, 073	100. 0
1953	458, 765	552, 786	627, 641	612, 263	731, 998	6, 733, 912	100. 0

[1] Compiled from reports of Pennsylvania Department of Mines. Does not include dredge coal.
[2] Less than 0.05 percent.

Data compiled from reports of the Massachusetts Division on the Necessaries of Life and the Association of American Railroads on receipts of Pennsylvania anthracite in the New England States are presented in table 34. As indicated, rail receipts declined 9 percent between 1953 and 1954 while the tidewater movement virtually ceased, with the small import volume actually exceeding the coastwise movement.

According to reports issued by the Ore and Coal Exchange, Cleveland, Ohio, Lake Erie loadings increased 8 percent in 1954. Shipments over Lake Ontario docks were insignificant, totaling less than 2,000 tons for the year. 1954 receipts at Lake Superior ports were 37 percent higher than in 1953 and Lake Michigan, 4 percent more. Despite these increases, however, stocks were 10 percent lower at year end at Lake Superior docks and 19 percent less at docks on Lake Michigan.

TABLE 34.—Receipts of anthracite in New England, 1917, 1920, 1923, 1927, and 1941–54, in thousand net tons

Year	Receipts by tidewater	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]	Year	Receipts by tidewater [4]	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]
1917	[1] 4,421	7 259	1	11,679	1946	399	5,244	----------	5,643
1920	[1] 3,521	7,804	1	11,324	1947	240	4,498	----------	4,738
1923	[1] 4,082	8,102	145	12.039	1948	217	4,646	----------	4.863
1927	[1] 2,421	6,725	106	9.040	1949	110	3,336	----------	3,446
1941	[1] 682	4,870	75	5,477	1950	81	3,615	18	3,678
1942	[4] 581	5,393	139	5,835	1951	66	3.135	27	3,174
1943	[4] 575	5,310	164	5,721	1952	70	2,847	29	2.888
1944	[4] 398	5,836	12	6,222	1953	49	2.088	31	2,106
1945	[4] 331	4,750	(5)	5,081	1954	10	1,893	6	1,897

[1] Commonwealth of Massachusetts, Division on the Necessaries of Life.
[2] U. S. Department of Commerce.
[3] Total receipts by rail and by tidewater less imports.
[4] Association of American Railroads.
[5] Less than 500 tons.

CONSUMPTION

The 6-percent decline in production in 1954 was accompanied by a 4-percent decline in apparent consumption (calculated on the basis of production, imports, exports, and changes in producers' stocks). The difference was attributable largely to the fact that producers' stocks during the year decreased approximately 600,000 tons. However, considering that stocks in retail yards declined an additional 800,000 tons between December 31, 1953, and the same date in 1954, it is obvious that the 1,400,000-ton decline in producer and retail yard stocks played an important role in holding down 1954 output. Inferentially, therefore, had it proved necessary to meet 1954 demand entirely from production, the output undoubtedly would have more closely approximated that for 1953.

Data are not available on the consumption of all fuels in the primary anthracite market area; however, table 35 presents apparent consumption of anthracite, domestic coke, briquets, heating and range oil, and natural gas, in terms of coal equivalent.

TABLE 35.—Apparent consumption of anthracite and selected competitive fuels in the principal anthracite markets, 1951–54

[Thousand net tons]

Fuel	New England	New York	New Jersey	Pennsylvania	Delaware	Maryland	District of Columbia	Total	Percent of total fuels
Anthracite (all users): [1]									
1951	2,956	[2] 9,482	[2] 4,519	11,512	240	422	136	29,267	28.8
1952	2,726	[2] 9,279	[2] 4,347	11,575	219	379	126	28,651	27.4
1953	2,067	[2] 7,502	[2] 3,968	11,405	204	333	102	25,581	25.0
1954	1,809	[2] 6,361	[2] 3,743	10,878	169	320	90	23,370	21.6
Imported: [3]									
1951	27	--------	--------	--------	--------	--------	--------	27	(4)
1952	29	--------	--------	--------	--------	--------	--------	29	(4)
1953	31	--------	--------	--------	--------	--------	--------	31	(4)
1954	6	--------	--------	--------	--------	--------	--------	6	(4)
Briquets (domestic use):									
1951	42	17	25	27	(5)	17	2	130	.1
1952	31	12	11	22	(5)	14	1	91	.1
1953	27	9	22	16	(5)	12	1	87	.1
1954	21	8	8	13	--------	9	1	60	.1
Coke (domestic use):									
1951	542	343	321	168	(5)	1	--------	1,375	1.4
1952	525	264	298	134	(5)	1	--------	1,222	1.2
1953	439	200	259	126	(5)	(5)	--------	1,024	1.0
1954	379	179	241	102	(5)	(5)	--------	901	.8
Imported: [3]									
1951	(5)	9	--------	4	--------	--------	--------	13	(4)
1952	(5)	159	--------	--------	--------	--------	--------	159	.2
1953	1	18	--------	--------	--------	--------	--------	19	(4)
1954	1	1	--------	--------	--------	--------	--------	2	(4)
Oil (heating and range): [6]									
1951	21,302	16,846	8.701	6.637	558	2,979	990	58.013	57.0
1952	21,367	16,957	8,666	6,990	606	3,115	1,104	58,805	56.3
1953	21,354	17,099	8,655	7,130	630	3,136	1,162	59,166	57.7
1954	23,199	18,051	9.034	8,030	725	3,897	1,217	64,153	59.2
Natural gas: [7]									
1951	58	4,416	790	6,468	(8)	(8)	[8] 1,248	12,980	12.7
1952	435	5,609	1,014	6,970	(8)	(8)	[8] 1,439	15,467	14.8
1953	837	5,934	1,272	7,028	(8)	(8)	[8] 1,542	16,613	16.2
1954	1,604	7,045	1,608	7,824	(8)	(8)	[8] 1,784	19,865	18.3
Total:									
1951	24,927	31,113	14,356	24,816	[9] 798	[9] 3,419	[9] 2,376	101,805	100.0
1952	25,113	32,280	14,336	25.691	[9] 825	[9] 3,509	[9] 2,670	104,424	100.0
1953	24,756	30,762	14,176	25,705	[9] 834	[9] 3,481	[9] 2,807	102,521	100.0
1954	27,019	31,645	14,634	26,847	[9] 894	[9] 4,226	[9] 3,092	108,357	100.0

[1] Pennsylvania Department of Mines.
[2] An important but undetermined part of anthracite shown as shipped to New Jersey is reshipped to New York City.
[3] U. S. Department of Commerce.
[4] Less than 0.05 percent.
[5] Less than 500 tons.
[6] Converted to coal equivalent upon basis of 4 barrels of fuel oil equaling 1 ton of coal.
[7] Converted to coal equivalent upon basis of 24,190 M cubic feet of natural gas equaling 1 ton of coal.
[8] Delaware and Maryland included with District of Columbia.
[9] Natural gas for Delaware and Maryland included with District of Columbia.

Consumption of anthracite by public utilities in 1954 was 12 percent under 1953, while the amount consumed by class I railroads was 16 percent less. After producing a record tonnage of oven coke in 1953, the coke industry went through a minor recession in 1954 owing to decreased demand for coke by the iron and steel industries. As a result, the quantity of anthracite mixed with bituminous coal in the manufacture of coke decreased from 275 thousand tons to 229 thousand tons, or 16 percent. The manufacture of fuel briquets also declined in 1954, with an attendant drop of 15 percent in the quantity of Pennsylvania anthracite used.

STOCKS

According to monthly estimates of the Bureau of Mines, stocks in retail dealers' yards have been declining steadily since 1952. For example, stocks in retail yards at the end of December 1954 totaled 1,495,000 net tons—34 percent less than on the same date in 1953 and 50 percent less than in 1952. On a size basis, retail stocks of Egg, Stove, and Chestnut combined dropped 36 percent between December 1953 and December 1954; Pea 28 percent; and Buckwheat No. 1 and Buckwheat No. 2 combined 34 percent. Moreover, contrary to the usual retail industry practice of stockpiling during the early spring and summer months to take advantage of the substantial discounts offered by producers, retail dealers evidenced little interest in stocking coal during the summer of 1954. As expected, retail stocks reached a low of 1.5 million tons in March and April but varied only between 1.6 and 1.8 million tons for the remainder of the year, except for December, when they again declined to the 1.5-million-ton level. The comparative failure of the summer-stockpiling program was the primary reason for the low rate of production during the April-August period.

In addition to the reluctance of retail dealers to stock heavily during the warmer months, other factors have contributed also to the decrease in retail stocks over the past few years:

(1) The actual number of retail dealers handling anthracite has been reduced substantially, either through normal attrition or by closures and consolidations brought about by decreased demand. The reduced number of dealers has resulted in a decrease in available storage space.

(2) The apparent belief of some dealers that adequate supplies of coal could be obtained from the mines on short notice, even in the coldest months when consumption is at a peak.

(3) The desire of other dealers to keep available a large part of their storage space in order to bargain with suppliers on prices. The latter was not only particularly evident during the latter half of 1953 and throughout 1954 but was considered in industry circles to be a factor contributing to the instability of the price structure.

At the beginning of 1954 producers had large supplies of coal in storage (1,726,000 tons at the end of January), which not only exerted an unfavorable influence on production but tended to depress the price structure. As almost 1 million tons of these stocks was Chestnut and Pea sizes, the efforts of some producers to reduce inventories by filling orders from stockpiles necessarily reduced working time, with the result that available supplies of the smaller sizes were restricted. By the end of the year producer stocks had dropped about 33 percent under December 1953.

Although total loadings over Lake Erie and Lake Ontario docks increased only about 5 thousand tons over 1953, receipts at upper Lake docks on Lake Superior and Lake Michigan increased 37 and 4 percent, respectively. Inasmuch as year-end stocks at Lake Superior docks were 10 percent less than in December 1953 and at Lake Michigan docks 19 percent less, it was apparent that the total demand for anthracite in the upper Lake region was considerably stronger than in 1953.

Despite a 12-percent decline in the consumption of anthracite at electric utility plants in 1954, the public utilities slowly built up stocks throughout the year. The low point was reached in March, when a total of 2.3 million tons was reported. The year's high was for December, when the figure exceeded 2.6 million tons, or approximately 14 percent more than the same month in 1953. At the end of 1954 stocks of anthracite held by class I railroads were also higher than in the preceding coal year, totaling 77,000 tons compared with 60,000.

TECHNOLOGY

If the downward trend in the output of Pennsylvania anthracite is to be stopped or reversed, it will undoubtedly result largely from a vigorous research and development program designed to create new markets for anthracite, to provide better methods of preparing the product, and to develop more efficient mining methods. With these general objectives in mind, the Federal Bureau of Mines is conducting an extensive research program at the Bureau's laboratory at Schuylkill Haven, Pa.

During 1954 several metallurgical processes were investigated for the possible application of anthracite and for developing basic data that might create new markets. Numerous iron-smelting blast-furnace plants were visited where small quantities of lump anthracite had been used recently as furnace fuel without substantial reduction in furnace output. Anthracite has been substituted for up to 20 percent of the total fuel charge in some smaller furnaces and up to a maximum of 10 percent in larger units. The history of the use of anthracite as fuel in foundry cupolas has paralleled the experience in blast furnaces.

Anthracite was investigated as a source of additional carbon in open-hearth steel furnaces, particularly for use in cold-metal shops where hot pig iron is not available and a large part of the charge is low-carbon scrap. The volatile content of anthracite places it at a disadvantage in open hearths, however, as some of the hydrogen present may remain in the steel, while the remaining gases may cause foaming of the slag and other difficulties as metal refining proceeds. Calcination of lump anthracite to reduce the volatile content is under investigation, and this process should make anthracite suitable as an open-hearth carbon additive, creating a new market should the process prove technically and economically feasible.

The practice of admixing a small percentage of anthracite fines with coking coals, which was undertaken on a commercial scale as early as 1941, has grown to such an extent that in 1954 229,000 tons of anthracite fines was charged to coke runs. Blending small percentages of selected anthrafines with suitable coking coals permits the use of higher oven-flue temperatures, when these are not already at the maximum, and thereby increases oven-throughputs. Other advantages are improved size uniformity, no material change in coke strength and greater flexibility in bituminous-coal selection at coke-oven plants, as anthrafines can be used to reduce the swelling characteristics of expanding coking coals. In 1954 a new fine-coal-preparation plant was placed in operation in the Eastern Middle field. This plant was designed with the blending and other specialized markets in view and was equipped to supply a well-sized, premium-quality anthrafine product.

A technical and economic study was made on the use of anthracite for controlling frost damage to farm crops and for use in portable crop driers. A report will be released on the frost-control study, which will indicate that market potentialities for anthracite appear to range from under 100,000 tons to as much as 250,000 tons annually under severe weather conditions. During the study it was found that existing anthracite stoker and furnace equipment could be adapted to this use.

The manufacture of anthracite producer gas for industrial process heating was investigated to supply the anthracite industry, as well as manufacturers and prospective users of the equipment, with information on the performance and operating characteristics of commercial anthracite gas-producer equipment. At one shale-brick plant where field work was done, the use of anthracite producer gas reduced overall manufacturing costs, since the uniform heat obtained improved both quality and yield. The faster heating obtained with gas firing also decreased the adverse effects of seasonal weather changes on the exposed kilns. At another plant, during a 2-week observation period, 300 tons of Rice and Buckwheat No. 1 anthracite was gasified in a twin producer installation to yield about 42 million cubic feet of producer gas at 60° F. The average hot-gas efficiency of the producers was 90 to 93 percent for gas leaving the producers at an average temperature of 530° F.

Two series of tests on the gasification of pulverized anthracite with oxygen and steam were made at the Bureau's Appalachian Experiment Station, Morgantown, W. Va. One series was conducted using a 36-percent ash material in a pressure gasifier at 300 p. s. i. g. while the other tests were made in an atmospheric pressure gasifier using a 10-percent-ash coal. Additional tests were considered necessary to obtain enough data for comparison with results obtained from bituminous coals and to modify the design of the reaction chambers in both types of gasifiers to eliminate the buildup of slag when anthracite is used.

The relative increase in the demand for finer sizes has created new problems in sizing, screening, and desliming anthracite. The lower value of fine coal requires that preparation practices be conducted with maximum economy and efficiency. To that end, the Bureau completed a study of the commercial application of the launder screen, a device that has been used for about a half century in preparing river-coal but that has been used by other segments of the industry only since 1949 for cleaning fine sizes of anthracite.[2] The study demonstrated that the launder screen can be used to prepare efficiently and economically the feed to, and products from, all types of anthracite fine-coal cleaning equipment. The device is stationary, with no moving parts, and is simply constructed. Thirty fine-coal cleaning plants now use these devices in preparing small coal for market.

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[2] Sanner, W. S., and Clendenin, J. D., Anthracite Launder Screens; Factors in Their Design and Operation: Bureau of Mines Rept. of Investigations 5032, 1954, 32 pp.

Anthracite-crushing practices historically have been predicated on the production of a maximum quantity of the larger sizes (Egg, Stove, and Chestnut) by using toothed, double-roll crushers. As demand for the larger sizes has now declined to a point where a surplus is being produced, shortages of the smaller sizes frequently occur, particularly in the Buckwheat No. 1 and Rice range ($\frac{3}{16}$–$\frac{9}{16}$ inch). Consequently, at the request of the industry, the Bureau of Mines has undertaken a study to determine which reduction method will yield the maximum output of Buckwheat No. 1 and Rice sizes from the larger coals. A number of non-roll-type crushers were studied, including impact, jaw, ring, and gyratory types. Of these, the gyratory type appeared to be the most efficient in recovering maximum quantities of the desired sizes. The gyratory crusher is rated at a capacity of 17 to 22 tons per hour when crushing dry limestone and will produce approximately 62 percent of Buckwheat No. 1 and Rice sizes, at 21-ton-per-hour capacity, from Chestnut size anthracite.

Experiments over a 2-year period with Bureau-owned Becorit collapsible steel props have demonstrated that definite advantages in safety, recovery, and efficiency are obtained when the roof is permitted to subside gradually and evenly over a wide area. On the basis of present knowledge, it is believed this type of roof action is attainable only by using such yielding supports with backfilling. During these experiments 25,000 tons of coal was removed, and it was found that convergence as great as 8 inches did not affect the immediate roof, and output per man-shift was increased 40 percent. Recovery of pillar coal was 90 percent.

A vibrating-blade coal planer has been designed by the Bureau for mining and loading coal without drilling or blasting. As the machine is pulled along the face the coal is sheared from the solid by the vibrating blade, which is actuated by pneumatic hammers and falls onto a conveyor. It is planned to test the planer in an anthracite mine next year. A suitable underground site was to be prepared by the cooperating anthracite company. Installation of the machine was nearly completed by the close of the year, and testing was planned for early 1955.

Following completion in 1953 of the first cooperative experimental work with the Bureau's pneumatic packing machine, the equipment was transferred to an area where the immediate removal of coal pillars was contemplated. Over a 10-month period in 1953, 26,000 tons of breaker refuse was packed into 20 chamber voids with the machine. The material was blown from a few hundred feet to a maximum of 1,310 feet, using compressed air and a 6-inch steel discharge line.

FOREIGN TRADE

In 1954, according to data of the United States Department of Commerce, only 5,831 net tons of anthracite entered the United States for consumption. Of this total, the entire amount (except for 132 tons) was imported from Great Britain through the Massachusetts customs district. As there has been no shortage of domestic supplies in recent years, the small annual token shipments by Great Britain undoubtedly have been motivated solely by the desire of British exporters to maintain trade contacts in this country. In view of the difficulties encountered by the National Coal Board of Great Britain in meeting 1954 commitments for export tonnages because of increased demands for coal in Britain's domestic economy, it might be expected that even these small shipments will be discontinued. For detailed data see table 36.

Exports of Pennsylvania anthracite totaled approximately 2.9 million net tons in 1954, a 5-percent increase over 1953. This increase was due almost entirely to a substantial gain in shipments to Western Europe, as exports to Canada were about 6 percent less than in 1953, while total exports to Asiatic, South American, and other North American countries were relatively the same in each year. Export data are shown in detail in table 37.

TABLE 36.—Anthracite imported for consumption in the United States, 1953–54, by countries and customs districts, in net tons

[U. S. Department of Commerce]

Country	1953	1954	Customs district	1953	1954
North America: Canada	66	132	Massachusetts	31,343	5,699
			Michigan	66	132
Europe:			New York	34	-------
Italy	34	-------	St. Lawrence	(1)	-------
United Kingdom	31,343	5,699			
Total Europe	31,377	5,699	Total	31,443	5,831
Grand total	31,443	5,831			

[1] Less than 1 ton.

Canada imported less anthracite from all sources in 1954 than in many years owing to continuation of relatively mild weather conditions and competition from heating oil. As previously noted, imports from the United States in 1954 were about 6 percent less than in 1953; however, according to the Dominion Bureau of Statistics, imports from Great Britain declined even more sharply—from 338,856 net tons in 1953 to 266,245 tons in 1954, a 21-percent drop.

During 1953 European coal output was generally adequate to supply demand without the importation of large tonnages from the United States; however, early in 1954 the level of industrial activity began to show definite signs of outstripping the advances in coal output. Consequently, a sharp upturn occurred in exports of anthracite to Europe in the summer and fall months. Whereas only 52 thousand net tons was shipped to Europe in 1953, the total climbed to 321 thousand tons in 1954, with clear indications that the 1955 volume would far outstrip the 1954 figure.

TABLE 37.—Anthracite exported from the United States, 1953–54, by countries and customs districts, in net tons

[U. S. Department of Commerce]

Country	1953	1954	Customs district	1953	1954
North America:			North America:		
British West Indies	362	----------			
Canada	2,601,818	2,456,747	Maine and New Hampshire	6,344	7,851
Cuba	51,742	59,491	Massachusetts	----------	60
Mexico	8,381	538	New York	1,228	10,191
			Philadelphia	121,009	392,842
Total North America	2,662,303	2,516,776	Rhode Island	5	----------
			South Atlantic:		
South America:			Maryland	3,923	392
Brazil	----------	392	Virginia	643	1,000
Colombia	165	----------	Gulf coast: El Paso	2,158	----------
Uruguay	225	----------	Mexican border: Laredo	548	538
			Northern border:		
Total South America	390	392	Buffalo	1,716,647	1,621,553
			Chicago	10,031	----------
Europe:			Dakota	46	81
France	----------	22,068	Michigan	113	726
Germany, West	----------	5,261	Ohio	14,308	24,717
Greece	12,288	34,273	Rochester	5,265	1,952
Italy	----------	78,015	St. Lawrence	814,640	753,490
Netherlands	----------	151,382	Vermont	27,302	34,796
Norway	18	----------			
Yugoslavia	39,830	29,512	Total	[1] 2,724,270	[1] 2,851,239
Total Europe	52,136	320,511			
Asia:					
Indochina	----------	10,847			
Israel and Palestine	7,646	----------			
Japan	1,792	2,713			
Saudi Arabia	3	----------			
Total Asia	9,441	13,560			
Grand total	2,724,270	2,851,239			

[1] Includes 60 tons in 1953 and 1,050 tons in 1954, representing estimated data for which district breakdown not available.

Although the U. S. S. R. does not publish data on foreign trade, a study of statistical releases issued by coal-importing countries indicated that Russia was an important exporter of anthracite in 1954. For instance, France, Italy, and the Netherlands, which have imported substantial quantities of Pennsylvania anthracite in the past, reported large imports of Russian anthracite in 1954. By countries, the figures follow: France, 446,745 tons; Italy, 121,236 tons; and the Netherlands, 153,661 tons.

WORLD PRODUCTION

World production of anthracite in 1954 was at relatively the same level as in 1953, since the net increase reported was both less than 1 million tons and 1 percent. The decline of approximately 1.9 million tons in the United States—the only significant decrease reported—was more than compensated for by increase in France, China, and the United Kingdom.

Although the U. S. S. R. does not publish official figures on coal production, the estimates shown in table 38, which are based on the most reliable information available, indicate that Russian output of anthracite has remained relatively stable since 1950, varying between 72.8 and 75.0 million net tons annually. In view of the steadily rising figures for total coal production in Russia during the same period, it might be concluded that the tonnages of anthracite produced either met the goals set under the various 5-year development plans or were considered adequate for all domestic and export requirements. In any event, it appears that the U. S. S. R. definitely has been placing major emphasis in recent years upon increasing output of bituminous coal for coking, chemical, and general industrial purposes while holding anthracite production fairly steady.

In Great Britain the National Coal Board made some progress in 1954 on plans to open several large new collieries in South Wales to replace many old, small, high-cost anthracite mines that have been worked beyond sound economic limits. As the mine-development work is proposed as a long-term project, however, any annual increments in output over the next few years are expected to be small.

TABLE 38.—World production of anthracite, 1950–54, by countries, in thousand short tons [1]

[Compiled by Pauline Roberts]

Country	1950	1951	1952	1953	1954
Belgium	[2] 6,300	[2] 7,200	7,572	7,893	7,781
Bulgaria [2]	28	31	33	33	33
China [2]	2,200	4,400	4,400	4,400	5,000
France	8,574	8,934	9,223	8,855	10,250
French Morocco	406	434	507	623	536
Germany:					
East [2]	260	260	260	270	270
West	[2] 8,600	[2] 9,100	9,743	11,347	11,528
Indochina	545	708	948	917	1,068
Ireland	108	117	121	127	115
Italy	76	90	90	75	71
Japan	756	1,045	1,111	1,204	1,376
Korea:					
Korea, Republic of	626	142	635	956	982
North Korea [2]	1,700	1,100	850	1,100	1,200
New Zealand	2	1	1	2	2
Peru	36	71	88	76	75
Portugal	462	460	487	527	476
Rumania [2]	35	40	55	55	55
Spain	1,658	1,765	2,024	2,150	2,156
Switzerland	11	11	11	11	11
U. S. S. R. [2]	72,800	74,700	75,000	75,000	75,000
United Kingdom	5,104	4,871	4,686	4,704	5,014
United States (Pennsylvania)	44,077	42,670	40,583	30,949	29,083
Total (estimate)	154,400	158,200	158,400	151,300	152,100

NOTE: An undetermined amount of semianthracite is included in the figures for some countries.

[1] This table incorporates a number of revisions of data published in previous anthracite tables.

[2] Estimate.

Coke and Coal Chemicals

By J. A. DeCarlo, T. W. Hunter, and Maxine M. Otero

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GENERAL SUMMARY

THE GENERAL decline in industrial activity in the United States during 1954 influenced coke-oven operations markedly, and output of oven and beehive coke dropped 24 percent from 1953. The drop in coke production, which began in the latter months of 1953, continued during the first half of 1954 and reached a low point in August. In September, following the upturn in pig iron and steel production, oven-coke output started to climb and increased in each succeeding month of 1954. Oven-coke plants owned and operated by iron and steel companies, classified by the Bureau of Mines as furnace plants, maintained a higher operating rate for the year than did other oven-coke plants. The rate of production for the furnace plants averaged 77 percent of capacity; whereas the nonfurnace or merchant plants operated at 61 percent. The average for all oven-coke plants was 75 percent compared with 93 percent for 1953.

Beehive-coke-oven operations did not follow the upturn in industrial activity in the latter months of 1954; consequently, the output of beehive coke was the lowest on record. Virtually all beehive-coke plants in the famous Connellsville district of Pennsylvania were idle throughout the year. The principal reasons for the closing of beehive ovens were the substantial decrease in requirements of blast-furnace coke and the expansion of carbonizing capacity of slot-type coke ovens by the iron and steel companies. Reduced requirements of blast-furnace coke resulted from (1) the low operating rates of blast furnaces and (2) a marked improvement in fuel efficiency of the furnaces. In 1954 blast furnaces producing pig iron used 67 pounds less coke per ton of pig iron produced than in 1953. Although this saving appears small, it totaled over 1.9 million tons of coke, based on the 1954 pig-iron production.

Yields of oven and beehive coke have varied only slightly in the past 3 decades. Since 1924 oven-coke yield ranged from a high of 71.01 percent in 1944 to a low of 68.43 percent in 1932. In 1954 the yield of oven coke, exclusive of breeze, was 69.78 percent—slightly less than the 1953 average. Coke yields are influenced by the kind and condition of the coals carbonized. Low-volatile coals generally contain a higher percentage of fixed carbon than the high-volatile and consequently yield more coke. For example, the merchant plants used 28.5 percent low-volatile in their coal mixtures, and coke yield averaged 71.64 percent, whereas the furnace plants used only 21.8 percent low-volatile coal and obtained a coke yield of 69.52 in 1954. Yields of coke from beehive ovens are lower than for slot-type ovens because some of the top layer of coal in a beehive oven is burned during the coking process; consequently, the beehive-coke yield rarely exceeds 65 percent. Yield of beehive coke in 1954 dropped to 61.35 percent from 63.74 in 1953.

The annual coke capacity of slot-type coke ovens increased 337,600 tons during 1954 and totaled 78,595,600 tons at the end of the year. The 1954 gain in capacity was not as large as anticipated because the decline in demand for coke caused permanent retirement of six bat-

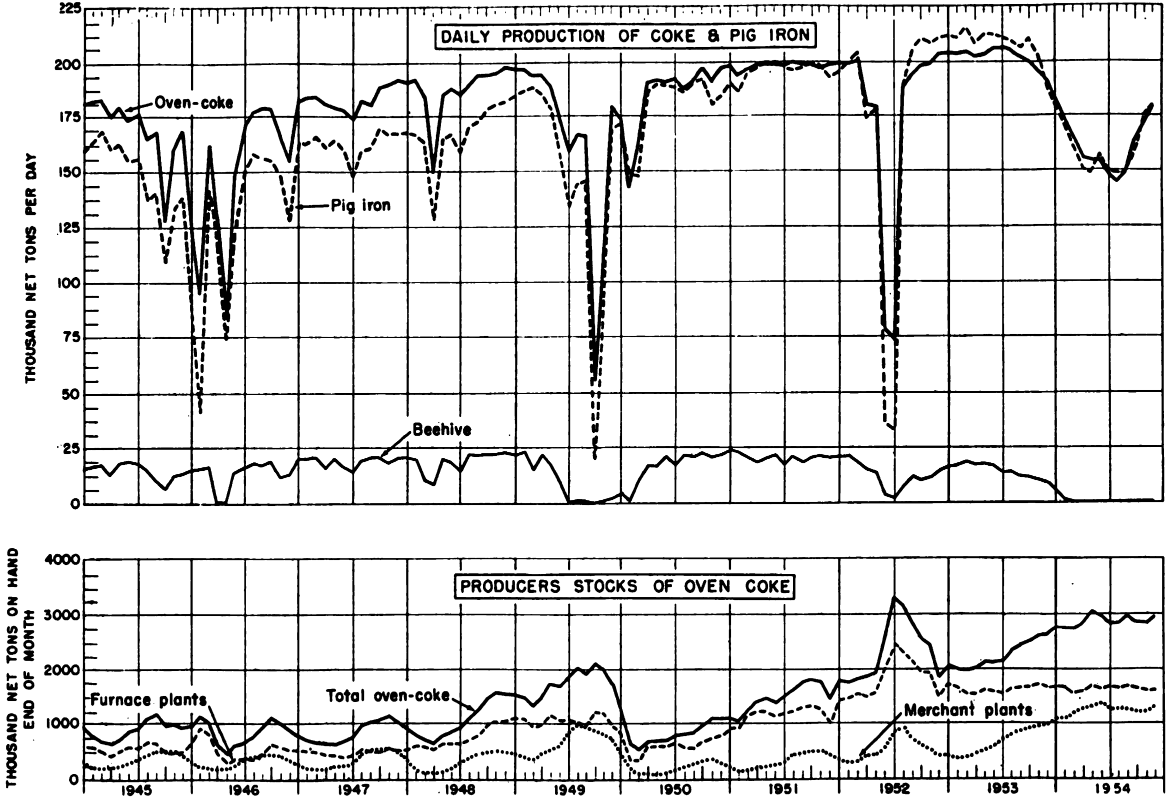

FIGURE 1.—Average daily production of oven and beehive coke and pig iron, and producers' stocks of oven coke, 1945–54, by months.

teries of coke ovens at merchant plants earlier than had been planned by the owners and also because construction of new ovens by iron and steel companies slackened. The annual coke capacity of slot-type ovens in the iron and steel industry increased 1.7 million tons, but this gain was nearly offset by the decrease of 1.4 million tons at merchant plants. The subject of coke capacity received special attention in Government and industry in 1954. The President established a Cabinet committee on Energy Supplies and Resources Policy on July 30, 1954, to evaluate the fuel resources of the Nation and devise policy for expanding supplies. The Director of the Office of Defense Mobilization was designated chairman, and the heads of the following agencies served as members: Departments of State, Treasury, Defense, Justice, Interior, Commerce, and Labor. The White House directive outlining the committee's assignment included the following specific statements:

> At the direction of the President the committee will undertake a study to evaluate all factors pertaining to the continued development of energy supplies and resources and fuels in the United States, with the aim of strengthening the national defense, providing orderly industrial growth, and assuring supplies for our expanding national economy and for any future emergency.
>
> The committee will review factors affecting the requirements and supplies of the major sources of energy including: Coal (anthracite, bituminous, and lignite, as well as coke, coal tars, and synthetic liquid fuels); petroleum and natural gas.

A task force consisting of Government and industry representatives was appointed to assist the committee. The committee submitted a report to the President in December, and the White House issued a summary in a press release on February 26, 1955. Item 11 of the press release, entitled "Mobilization Requirements for Coke," contained the following statement:

> The committee believes that present and prospective rates of shutdown and dismantling of slot-type coke ovens will leave inadequate coking capacity to support full mobilization production of steel and other essential wartime industry.
>
> On the basis of national security, coke requirements can only be met if the Office of Defense Mobilization is directed to prepare plans to make the necessary arrangements and tests to expand coke production rapidly in the case of an emergency.

Although delivered costs of coal fell slightly, labor costs continued to rise. The average value of coal at both oven and beehive plants was $8.97 compared with $9.03 for 1953. These figures are not strictly comparable, as the value in 1953 was influenced to a greater extent by the lower value for coal charged into beehive ovens, which represented 7 percent of the total quantity carbonized. In 1954 coal carbonized by beehive ovens composed only 1 percent of the total. The reported value of coal at beehive ovens was actually $0.08 per ton higher, but this was more than offset by the decline of $0.24 per ton for the coal delivered to oven-coke plants.

Labor costs increased slightly, according to data published by the Bureau of Labor Statistics. The average weekly and hourly earnings of production workers for "coke and other petroleum and coal products" were $80.73 and $1.95, respectively, compared with $78.81 and $1.89 in 1953. The averge hourly earnings increased $0.06 per hour, but the average time worked decreased slightly from 41.7 hours in 1953 to 41.4 hours in 1954. According to the annual survey on employment conducted by the Bureau of Mines, employment fell in the coke industry, particularly at beehive plants. The average number of men working at beehive plants dropped to 1,203 in 1954 from 2,429 reported in 1953, and man-hours worked receded to 576,931 from 3,580,299 in 1953. For slot-type ovens the average number of men working dropped from 21,011 employed in 1953 to 18,144 and man-hours worked fell from 61,096,328 to 52,393,761 in 1954. These data pertain to all workers in the coke industry subject to work hazards and include workers in construction, development, maintenance, and repair, as well as supervisory and technical personnel in the plants, but do not include office workers.

Production of coal chemicals depends largely on coke-oven operations, since these chemicals are made by the processing of the ammonia, tar, and light oil recovered from the gas stream. The recession in coke-oven operations reduced the output of the coal-chemical materials, and ammonia production (NH_3 equivalent of all forms) fell 15 percent; crude tar, 14 percent; and crude light oil, 17 percent. Production of the various derivatives of these basic materials fluctuated more widely. The ammonia products, sulfate and liquor, decreased 13 and 35 percent, respectively. The principal light-oil derivatives—benzene, toluene, and solvent naphtha—fell 20, 7, and 27 percent, respectively, while xylene output increased slightly. The main tar derivatives—creosote oil, crude chemical oil, phenol, and pitch—dropped 29, 7, 9, and 15 percent, respectively. Although crude naphthalene production declined 11 percent in 1954, new facilities completed in the latter part of the year prevented a larger decrease and enabled the coke-producing companies to produce a higher quality naphthalene, pure enough to use in the manufacture of certain synthetic organic chemical intermediates, without further processing and upgrading. Before 1954 over 50 percent of the crude naphthalene produced at oven-coke plants was unsuitable for manufacturing intermediates and had to be upgraded by chemical companies. The change in quality of naphthalene made at coke plants was quite noticeable in 1954. Less than one-fourth of the total produced had a solidification point of less than 74° C. compared with 50 percent in 1953. It was apparent, therefore, that over three-fourths of the 1954 output of coke-oven naphthalene was used by the chemical industry without any further refinement.

Markets for most of the coal chemicals held up fairly well in 1954, and at the end of the year stocks at producing plants had changed little from those in the previous year. Prices on most of the coal chemicals remained about the same as in 1953, although prices on several commodities were reduced. Ammonium sulfate was cut $2 to $3 per ton by coke-oven operators around the middle of the year; this is reflected in the average value reported to the Bureau of Mines of $0.021 per pound compared with $0.022 in 1953. In the last quarter of 1954, benzene consumers showed some resistance to the prevailing prices, and a 4-cent-per-gallon reduction occurred in the first week of January 1955. This, however, did not affect the 1954 average value for the specification grades of benzene. Pyridine prices, which began to decline in 1953, fell further in 1954, and the refined 2° grade averaged $0.879 per pound. However, as a whole the year was fairly good, and the total value of coal-chemical materials sold was $292,243,755, or only 16 percent lower than the record set in 1953.

TABLE 1.—Salient statistics of the coke industry in the United States, 1947–49 (average) and 1953–54

	1947–49 (average)	1953	1954
Coke produced:			
Oven ... net tons	65, 088, 462	73, 593, 528	59, 061, 442
Beehive ... do	5, 559, 940	5, 243, 329	601, 054
Total ... do	70, 648, 402	78, 836, 857	59, 662, 496
Distribution, all coke sold or used:			
To blast-furnace plants ... do	56, 145, 621	69, 728, 500	51, 973, 401
To foundries ... do	3, 393, 176	3, 040, 971	2, 568, 561
To other industrial plants (including producer and water gas) ... net tons	7, 391, 615	4, 006, 560	3, 472, 132
For residential heating ... do	3, 392, 826	1, 467, 962	1, 266, 722
Imports, all coke ... do	181, 000	157, 318	115, 781
Exports, all coke ... do	696, 502	520, 252	384. 377
Apparent consumption, all coke ... do	69, 852, 671	77, 695, 872	59, 124, 768
Producers' stocks of coke, Dec. 31 ... do	[1] 1, 769, 456	2, 679, 708	2, 948, 840
Value of coal-chemical materials sold or used	$254, 681, 622	$359, 879, 092	$308, 357, 211
Value of coke and breeze produced	867, 047, 809	1, 179, 400, 694	969, 419, 194
Total value of all products	1, 121, 729, 431	1, 539, 279, 786	1, 277, 776, 405

[1] 1949.

TABLE 2.—Statistical summary of the coke industry in the United States in 1954

	Slot-type ovens	Beehive ovens	Total
Coke produced—			
At merchant plants:			
Net tons	7, 362, 967	(2)	(2)
Value	$122, 679, 136		
At furnace plants: [1]			
Net tons	51, 698, 475		
Value	$818, 089, 937		
Total:			
Net tons	59, 061, 442	601, 054	59, 662, 496
Value	$940, 769, 073	$8, 511, 488	$949, 280, 561
Breeze produced:			
Net tons	3, 930, 553	27, 523	3, 958, 076
Value	$19, 964, 416	$174, 217	$20, 138, 633
Coal carbonized:			
Bituminous:			
Net tons	84, 410, 600	979, 646	85, 390, 246
Value	$759, 564, 706	$6, 304, 656	$765, 869, 362
Average per ton	$9. 00	$6. 44	$8. 97
Anthracite:			
Net tons	229, 373		229, 373
Value	$1, 951, 549		$1, 951, 549
Average per ton	$8. 51		$8. 51
Total:			
Net tons	84, 639, 973	979, 646	85, 619, 619
Value	$761, 516, 255	$6, 304, 656	$767, 820, 911
Average per ton	$9. 00	$6. 44	$8. 97
Average yield in percent of total coal carbonized:			
Coke	69. 78	61. 35	69. 68
Breeze (at plants actually recovering)	4. 65	6. 72	4. 66
Ovens:			
In existence Jan. 1	15, 989	15, 092	31, 081
In existence Dec. 31	15, 891	12, 216	28, 107
Dismantled during year	866	[3] 2, 972	3, 838
In course of construction Dec. 31	490	23	513
Annual coke capacity Dec. 31 ... net tons	78, 595, 600	8, 077, 800	86, 673, 400
Coke used by producing companies:			
In blast-furnace plants:			
Net tons	50, 056, 776	204, 878	50, 261, 654
Value	$792, 018, 934	$3, 172, 449	$795, 191, 383
In foundries:			
Net tons	240, 107		240, 107
Value	$5, 386, 011		$5, 386, 011
For producer-gas manufacture:			
Net tons	342, 148		342, 148
Value	$4, 962, 302		$4, 962, 302

See footnotes at end of table.

TABLE 2.—Statistical summary of the coke industry in the United States in 1954—Continued

	Slot-type ovens	Beehive ovens	Total
Coke used by producing companies—Continued			
For water-gas manufacture:			
Net tons	1, 028, 646	--------------	1, 028, 646
Value	$9, 975, 528	--------------	$9, 975, 528
For other industrial purposes:			
Net tons	538, 146	121	538, 267
Value	$8, 312, 529	$1, 646	$8, 314, 175
Coke sold (commercial sales)—			
To blast-furnace plants:			
Net tons	1, 597, 560	114, 187	1, 711, 747
Value	$22, 092, 110	$1, 641, 900	$23, 734, 010
To foundries:			
Net tons	2, 296, 200	32, 254	2, 328, 454
Value	$53, 742, 508	$495, 010	$54, 237, 518
To water-gas plants:			
Net tons	63, 145	57	63, 202
Value	$1, 061, 369	$721	$1, 062, 090
To other industrial plants:			
Net tons	1, 248, 836	251, 033	1, 499, 869
Value	$15, 594, 403	$3, 215, 319	$18, 809, 722
For residential heating:			
Net tons	1, 263, 414	3, 308	1, 266, 722
Value	$18, 742, 119	$42, 311	$18, 784, 430
Disposal of breeze:			
Used by producing companies:			
For steam raising:			
Net tons	2, 480, 581	--------------	2, 480, 581
Value	$11, 912, 234	--------------	$11, 912, 234
For producer- or water-gas manufacture			
Net tons	33, 716	--------------	33, 716
Value	$154, 333	--------------	$154, 333
For other industrial purposes:			
Net tons	976, 849	--------------	976, 849
Value	$5, 071, 678	--------------	$5, 071, 678
Sold (commercial sales):			
Net tons	841, 845	56, 734	898, 579
Value	$4, 582, 858	$312, 630	$4, 895, 488
Average receipts per ton (commercial sales):			
Blast-furnace coke	$13. 83	$14. 38	$13. 87
Foundry coke	$23. 40	$15. 35	$23. 29
Water-gas coke	$16. 81	$12. 65	$16. 80
Other industrial coke	$12. 49	$12. 81	$12. 54
Residential heating coke	$14. 83	$12. 79	$14. 83
Breeze	$5. 44	$5. 51	$5. 45
Producers' stocks, December 31:			
Blast-furnace coke	2, 063, 468	2, 011	2, 065, 479
Foundry coke	140, 556	808	141, 364
Residential heating and other coke	737, 547	4, 450	741, 997
Breeze	663, 645	440	664, 085
Coal-chemical materials produced:			
Tar, crude, gallons	715, 840, 473	--------------	715, 840, 473
Ammonium sulfate or equivalent, pounds	1, 774, 464, 664	--------------	1, 774, 464, 664
Gas, M cubic feet	869, 874, 515	--------------	869, 874, 515
Burned in coking process, percent	34. 31	--------------	34. 31
Surplus sold or used, do	64. 19	--------------	64. 19
Wasted, do	1. 50	--------------	1. 50
Crude light oil, gallons	246, 018, 627	--------------	246, 018, 627
Yield of coal-chemical materials per ton of coal:			
Tar, crude, gallons	8. 46	--------------	8. 46
Ammonium sulfate or equivalent, pounds	21. 09	--------------	21. 09
Gas, M cubic feet	10. 28	--------------	10. 28
Crude light oil, gallons	2. 98	--------------	2. 98
Value of coal-chemical materials sold or used:			
Tar, crude:			
Used by producers as fuel	$16, 113, 456	--------------	$16, 113, 456
Sold	$38, 487, 182	--------------	$38, 487, 182
Ammonia (sulfate and liquor)	$35, 711, 119	--------------	$35, 711, 119
Gas (surplus)	$128, 565, 914	--------------	$128, 565, 914
Crude light oil and derivatives	$69, 362, 454	--------------	$69, 362, 454
Other coal-chemical materials[4]	$20, 117, 086	--------------	$20, 117, 086

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[1] Plants associated with iron blast furnaces (refer to definition given in Scope of Report).

[2] Not separately recorded.

[3] Idle and not expected to resume production; removed from list of available ovens.

[4] Naphthalene, tar derivatives, and miscellaneous materials.

TABLE 3.—Summary of coke-oven operations in the United States in 1954, by States

State	Oven coke						
	In existence Dec. 31 [1]		Coal carbonized (net tons)	Yield of coke from coal (percent)	Coke produced (net tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Alabama	7	1, 389	7, 265, 403	72. 97	5, 301, 550	$88, 993, 489	$16. 79
California	1	225	1, 068, 156	58. 75	627, 577	(2)	(2)
Colorado	1	257	976, 495	67. 82	662, 282	(2)	(2)
Illinois	8	711	3, 209, 485	70. 05	2, 248, 206	38, 969, 746	17. 33
Indiana	5	2, 003	11, 570, 447	70. 87	8, 200, 262	144, 961, 650	17. 68
Maryland	1	687	4, 252, 947	72. 38	3, 078, 371	(2)	(2)
Massachusetts	1	108	755, 456	68. 35	516, 344	(2)	(2)
Michigan	4	691	3, 129, 883	73. 77	2, 308, 924	41, 287, 925	17. 88
Minnesota	3	241	1, 134, 362	70. 86	803, 860	17, 952, 483	22. 33
New Jersey	2	341	1, 307, 844	71. 09	929, 768	(2)	(2)
New York	4	862	5, 178, 791	69. 10	3, 578, 703	52, 685, 854	14. 72
Ohio	16	2, 533	11, 877, 465	69. 28	8, 228, 873	126, 685, 567	15. 40
Pennsylvania	14	4, 017	23, 013, 594	67. 64	15, 566, 002	232, 195, 163	14. 92
Tennessee	1	44	194, 714	79. 19	154, 194	(2)	(2)
Texas	2	140	980, 102	71. 37	699, 536	(2)	(2)
Utah	2	308	1, 538, 594	64. 85	997, 749	(2)	(2)
Virginia	------	------	------	------	------	------	------
West Virginia	5	772	5, 183, 406	71. 55	3, 708, 905	43, 609, 417	11. 76
Connecticut, Kentucky, Missouri, and Wisconsin	4	562	2, 002, 829	72. 41	1, 450, 336	25, 220, 963	17. 39
Undistributed	------	------	------	------	------	128, 206, 816	16. 72
Total 1954	81	15, 891	84, 639, 973	69. 78	59, 061, 442	940, 769, 073	15. 93
At merchant plants	23	2, 458	10, 277, 302	71. 64	7, 362, 967	122, 679, 136	16. 66
At furnace plants	58	13, 433	74, 362, 671	69. 52	51, 698, 475	818, 089, 937	15. 82
Total 1953	82	15, 989	104, 922, 927	70. 14	73, 593, 528	1, 080, 304, 156	14. 68

State	Beehive coke						Total	
	Ovens in existence Dec. 31	Coal carbonized (net tons)	Yield of coke from coal (percent)	Coke produced (net tons)	Value of coke at ovens		Coke produced (net tons)	Value of coke at ovens
					Total	Per ton		
Alabama	------	------	------	------	------	------	5, 301, 550	$88, 993, 489
California	------	------	------	------	------	------	627, 577	(2)
Colorado	------	------	------	------	------	------	662, 282	(2)
Illinois	------	------	------	------	------	------	2, 248, 206	38, 969, 746
Indiana	------	------	------	------	------	------	8, 200, 262	144, 961, 650
Maryland	------	------	------	------	------	------	3, 078, 371	(2)
Massachusetts	------	------	------	------	------	------	516, 344	(2)
Michigan	------	------	------	------	------	------	2, 308, 924	41, 287, 925
Minnesota	------	------	------	------	------	------	803, 860	17, 952, 483
New Jersey	------	------	------	------	------	------	929, 768	(2)
New York	------	------	------	------	------	------	3, 578, 703	52, 685, 854
Ohio	------	------	------	------	------	------	8, 228, 873	126, 685, 567
Pennsylvania	10, 407	668, 179	64. 66	432, 061	$5, 884, 403	$13. 62	15, 998, 063	238, 079, 566
Tennessee	------	------	------	------	------	------	154, 194	(2)
Texas	------	------	------	------	------	------	699, 536	(2)
Utah	297	106, 976	54. 74	58, 558	(2)	(2)	1, 056, 307	(2)
Virginia	482	140, 195	51. 42	72, 092	1, 032, 462	14. 32	72, 092	1, 032, 462
West Virginia	835	64, 296	59. 64	38, 343	(2)	(2)	3, 747, 248	(2)
Connecticut, Kentucky, Missouri, and Wisconsin	195	------	------	------	------	------	1, 450, 336	25, 220, 963
Undistributed	------	------	------	------	1, 594, 623	16. 46	------	173, 410, 856
Total 1954	12, 216	979, 646	61. 35	601, 054	8, 511, 488	14. 16	59, 662, 496	949, 280, 561
Total 1953	15, 092	8, 226, 097	63. 74	5, 243, 329	76, 257, 848	14. 54	78, 836, 857	1,156,562,004

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[1] Excludes plants retired permanently during year.

[2] Included with "Undistributed" to avoid disclosure of individual company figures.

SCOPE OF REPORT

Except where otherwise noted, the statistics in this chapter are based on data voluntarily supplied to the Bureau of Mines by United States coke-producing companies. The data are confined to the products made in high-temperature slot-type and beehive-coke ovens and do not include products made by other processes (coal-gas retorts, low-temperature carbonization of coal, and carbonization of the residue from refining crude tar and petroleum). Statistics on retort and low-temperature carbonization coke in the United States are given in table 4. Production of petroleum coke totaled 4.9 million tons in 1954, and the United States Tariff Commission reported that 24,000 tons of coal-tar-pitch coke was produced.

There were 82 active oven-coke plants in the United States in 1954. operated by 45 companies. Detailed monthly and annual reports were received from every plant. In the beehive-coke industry 57 companies submitted reports on 76 plants. As submission of these reports is not mandatory, the Bureau of Mines could not obtain reports from three small beehive plants that operated spasmodically during the year. Production at these plants was estimated from railroad reports on their carloadings, and coverage of the beehive industry is believed to be complete.

The production totals of coke, breeze, coke-oven gas, crude tar, and crude light oil for 1954 will be compared with Bureau of the Census totals for these commodities when they become available. Differences in the totals will be adjusted and explained in a subsequent release.

For data not collected by the Bureau of Mines but incorporated into this chapter, the Bureau of Mines is indebted to the Bureau of the Census, United States Department of Commerce, and the American Iron and Steel Institute.

Although the terms "merchant" and "furnace" plants originated in the beehive-coke industry, in this chapter this classification applies only to oven-coke plants. Furnace plants are under direct ownership of, or have a financial affiliation with, iron and steel companies whose main business is production of coke for use in their own blast furnaces. All other plants are classified as merchant and include those that manufacture metallurgical, industrial, and domestic grades of coke for sale on the open market; coke companies associated with chemical plants; gas utilities; and those affiliated with local iron works where only a minor part (less than 50 percent of their output) is used in affiliated blast furnaces.

The Bureau of Mines does not attempt to collect statistics on the cost of manufacturing coke. Values and prices on coal, coke, and other products shown in this chapter are obtained from annual reports submitted to the Bureau of Mines by producing companies. For coke, gas, and coal chemicals sold (commercial sales) the dollar values are the amounts received for the products f. o. b. ovens. For 1954 a different procedure was used to determine the dollar value of coke-oven products used by the producing companies. The values assigned to coke, breeze, and gas used by producers are the market values of these products at producing plants rather than bookkeeping values formerly assigned according to the accounting procedures of the companies. Therefore the values of coke and breeze produced and surplus gas used by producing companies in 1954 are not comparable with those reported in preceding years.

The term "coke", as used in this chapter, refers only to the large sizes (usually one-half inch plus) from which the smaller sizes, which are known as breeze, have been screened. Metallurgical coke refers to the grades (blast furnace and foundry) used for smelting and casting ferrous metals. The standard unit of measurement in the coke industry is the net or short ton of 2,000 pounds, which is employed throughout this chapter.

RETORT AND LOW-TEMPERATURE COKE

TABLE 4.—Salient statistics on retort and low-temperature coke in the United States in 1954 [1]

	Quantity	Value
Coke produced......net tons..	255, 904	$2, 393, 683
Coal carbonized......do....	383, 402	1, 506, 699
Average value per ton......	......	3. 93
Average yield in percent of coal carbonized......	66. 75	......
Retorts and ovens:......		
In existence Dec. 31......	10	......
Annual coal capacity......net tons..	459, 000	......
Coke used and sold......do....	211, 102	1, 954, 394
Tar produced......gallons..	5, 052, 396	......
Tar used and sold......do....	5, 041, 296	302, 477
Tar per ton of coal carbonized......do....	13. 18	......

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[1] Excludes data on operations of coal-gas plants.

OVEN AND BEEHIVE COKE AND BREEZE

MONTHLY PRODUCTION

TABLE 5.—Coke produced in the United States and average per day, 1947–49 (average) and 1952–54, by months, in net tons [1]

Month	1947–49 (average)		1952		1953		1954	
	Total	Daily average	Total	Daily average	Total	Daily average	Total	Daily average
Oven coke:								
January	5, 875, 300	189, 500	6, 186, 700	199, 600	6, 316, 600	203, 800	5, 643, 100	182, 000
February	5, 393, 400	192, 600	5, 787, 900	199, 600	5, 703, 600	203, 700	4, 831, 300	172, 500
March	5, 775, 800	186, 300	6, 221, 300	200, 700	6, 326, 900	204, 100	5, 117, 500	165, 100
April	5, 231, 600	174, 400	5, 389, 700	179, 700	6, 059, 500	202, 000	4, 667, 600	155, 600
May	5, 707, 400	184, 100	5, 556, 200	179, 200	6, 310, 300	203, 500	4, 782, 100	154, 300
June	5, 409, 700	180, 300	2, 368, 600	78, 900	6, 154, 500	205, 200	4, 618, 000	153, 900
July	5, 355, 900	172, 800	2, 311, 300	74, 600	6, 369, 400	205, 500	4, 600, 600	148, 400
August	5, 564, 400	179, 500	5, 808, 300	187, 400	6, 340, 700	204, 500	4, 485, 800	144, 700
September	5, 394, 700	179, 800	5, 804, 800	193, 500	6, 061, 100	202, 000	4, 464, 900	148, 800
October	4, 519, 000	145, 800	6, 137, 900	198, 000	6, 210, 500	200, 300	5, 063, 400	163, 300
November	5, 003, 500	166, 800	5, 986, 700	199, 600	5, 915, 300	197, 200	5, 207, 200	173, 600
December	5, 857, 800	189, 000	6, 290, 700	202, 900	5, 825, 200	187, 900	5, 579, 900	180, 000
Total	65, 088, 500	178, 300	63, 850, 100	174, 500	73, 593, 600	201, 600	59, 061, 400	161, 800
Beehive coke:								
January	623, 500	20, 100	625, 000	20, 100	483, 400	15, 600	164, 900	5, 400
February	574, 900	20, 600	574, 000	19, 800	466, 400	16, 700	63, 200	2, 300
March	461, 900	14, 900	563, 100	18, 200	557, 000	18, 000	35, 600	1, 100
April	445, 000	14, 800	414, 000	13, 800	524, 500	17, 500	36, 800	1, 200
May	582, 300	18, 800	400, 200	12, 900	551, 000	17, 800	32, 800	1, 000
June	432, 500	14, 400	113, 100	3, 800	504, 100	16, 800	34, 500	1, 200
July	304, 500	9, 800	59, 300	1, 900	413, 600	13, 300	33, 700	1, 100
August	425, 000	13, 700	220, 500	7, 100	421, 000	13, 600	44, 000	1, 400
September	413, 500	13, 800	354, 900	11, 800	371, 700	12, 400	40, 200	1, 400
October	428, 800	13, 800	302, 400	9, 800	363, 600	11, 800	32, 500	1, 100
November	411, 700	13, 700	345, 100	11, 500	307, 300	10, 200	39, 700	1, 300
December	456, 300	14, 700	432, 400	14, 000	279, 700	9, 000	43, 200	1, 400
Total	5, 559, 900	15, 300	4, 404, 000	12, 000	5, 243, 300	14, 400	601, 100	1, 700
Total:								
January	6, 498, 800	209, 600	6, 811, 700	219, 700	6, 800, 000	219, 400	5, 808, 000	187, 400
February	5, 968, 300	213, 200	6, 361, 900	219, 400	6, 170, 000	220, 400	4, 894, 500	174, 800
March	6, 237, 700	201, 200	6, 784, 400	218, 900	6, 883, 900	222, 100	5, 153, 100	166, 200
April	5, 676, 600	189, 200	5, 803, 700	193, 500	6, 584, 000	219, 500	4, 704, 400	156, 800
May	6, 289, 700	202, 900	5, 956, 400	192, 100	6, 861, 300	221, 300	4, 814, 900	155, 300
June	5, 842, 200	194, 700	2, 481, 700	82, 700	6, 658, 600	222, 000	4, 652, 500	155, 100
July	5, 660, 400	182, 600	2, 370, 600	76, 500	6, 783, 000	218, 800	4, 634, 300	149, 500
August	5, 989, 400	193, 200	6, 028, 800	194, 500	6, 761, 700	218, 100	4, 529, 800	146, 100
September	5, 808, 200	193, 600	6, 159, 700	205, 300	6, 432, 800	214, 400	4, 505, 100	150, 200
October	4, 947, 800	159, 600	6, 440, 300	207, 800	6, 574, 100	212, 100	5, 095, 900	164, 400
November	5, 415, 200	180, 500	6, 331, 800	211, 100	6, 222, 600	207, 400	5, 246, 900	174, 900
December	6, 314, 100	203, 700	6, 723, 100	216, 900	6, 104, 900	196, 900	5, 623, 100	181, 400
Grand total	70, 648, 400	193, 600	68, 254, 100	186, 500	78, 836, 900	216, 000	59, 662, 500	163, 500

[1] Daily average calculated by dividing monthly production by number of days in month.

PRODUCTION BY FURNACE AND MERCHANT PLANTS

The accompanying table on the production of oven coke by furnace and merchant plants indicates the steady gain made by the furnace group in the past 5 years in relation to total output. Before World War II the merchant group produced 20 to 50 percent of the annual output of oven coke. Because of diversified interests (chemicals, gas, and domestic coke) coke production at merchant plants usually was more stable than at furnace plants where production was more closely related to trends in the steel industry. However, since World War II there has been a significant change in the pattern of fuel consumption which has had a profound effect on the demand for merchant oven coke. Because of the widespread construction and extension of natural-gas pipelines and the tremendous increase in fuel-oil production, competition of these fuels has adversely affected the demand for coke-oven gas, coke for residential heating, and coke for chemical processing (ammonia). A balanced market for coke, gas, and coal chemicals is essential for economic operation of a merchant coke plant. Therefore, the loss of gas and coke markets made it difficult for a number of merchant plants to continue operations; consequently, production of coke and the number of active merchant plants have declined

TABLE 6.—Number and production of oven-coke plants in the United States, 1929, 1939, 1947–49 (average) and 1951–54, by types of plant

Year	Number of active plants [1]		Coke produced (net tons)		Percent of production	
	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants
1929	46	41	41, 224, 387	12, 187, 439	77. 2	22. 8
1939	45	39	31, 811, 807	11, 070, 506	74. 2	25. 8
1947–49 (average)	[2] 55	[2] 31	51, 974, 089	13, 114, 373	79. 9	20. 1
1951	56	28	58, 796, 622	13, 190, 550	81. 7	18. 3
1952	57	27	52, 128, 906	11, 721, 209	81. 6	18. 4
1953	58	25	62, 628, 176	10, 965, 352	85. 1	14. 9
1954	58	24	51, 698, 475	7, 362, 967	87. 5	12. 5

[1] Includes plants operating any part of year.
[2] On Dec. 31,1949.

TABLE 7.—Monthly and average daily production of oven coke in the United States, 1947–49 (average) and 1953–54, by types of plant, in net tons

Month	1947–49 (average)		1953		1954	
	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants
Monthly production:						
January	4, 700, 600	1, 174, 700	5, 334, 300	982, 300	4, 827, 700	815, 400
February	4, 323, 300	1, 070, 100	4, 814, 500	889, 100	4, 135, 000	696, 300
March	4, 618, 000	1, 157, 800	5, 343, 000	983, 900	4, 396, 600	720, 900
April	4, 188, 600	1, 043, 000	5, 105, 500	954, 000	4, 032, 800	634, 800
May	4, 578, 100	1, 129, 300	5, 331, 900	978, 400	4, 163, 800	618, 300
June	4, 329, 000	1, 080, 700	5, 212, 700	941, 800	4, 097, 800	520, 200
July	4, 273, 800	1, 082, 100	5, 419, 200	950, 200	4, 107, 900	492, 700
August	4, 466, 700	1, 097, 700	5, 420, 000	920, 700	3, 987, 800	498, 000
September	4, 321, 900	1, 072, 800	5, 230, 300	830, 800	3, 972, 600	492, 300
October	3, 471, 600	1, 047, 400	5, 367, 400	843, 100	4, 510, 300	553, 100
November	3, 977, 500	1, 026, 000	5, 081, 800	833, 500	4, 574, 400	632, 800
December	4, 725, 000	1, 132, 800	4, 967, 600	857, 600	4, 891, 800	688, 100
Total	51, 974, 100	13, 114, 400	62, 628, 200	10, 965, 400	51, 698, 500	7, 362, 900
Average daily production:						
January	151, 600	37, 900	172, 100	31, 700	155, 700	26, 300
February	154, 400	38, 200	171, 900	31, 800	147, 700	24, 800
March	149, 000	37, 300	172, 400	31, 700	141, 800	23, 300
April	139, 600	34, 800	170, 200	31, 800	134, 400	21, 200
May	147, 700	36, 400	172, 000	31, 500	134, 300	20, 000
June	144, 300	36, 000	173, 800	31, 400	136, 600	17, 300
July	137, 900	34, 900	174, 800	30, 700	132, 500	15, 900
August	144, 100	35, 400	174, 800	29, 700	128, 600	16, 100
September	144, 100	35, 700	174, 300	27, 700	132, 400	16, 400
October	112, 000	33, 800	173, 100	27, 200	145, 500	17, 800
November	132, 600	34, 200	169, 400	27, 800	152, 500	21, 100
December	152, 400	36, 600	160, 200	27, 700	157, 800	22, 200
Average for year	142, 400	35, 900	171, 600	30, 000	141, 600	20, 200

steadily in the past decade. Although production of oven coke from merchant plants has been decreasing each year, production from furnace plants has increased. Table 6 shows that production from merchant plants during 1947–49 averaged 20 percent of the total oven-coke production. Since that time the proportion of oven coke produced at merchant plants has declined steadily to 12 percent of the total in 1954, whereas the proportion of furnace coke produced increased 10 percent in the same period to 88 percent, the highest proportion on record. Although output from furnace plants was about 10 million tons less than in 1953, it nearly equaled production in 1947–49.

PRODUCTION BY STATES AND DISTRICTS

Production of oven and beehive coke, by States, is shown in table 8. The sharp reduction in output in 1954 does not reflect a trend that started at the end of World War II. A better analysis of trend is obtained by comparing 1954 State outputs with the average during 1947–49. Although the production rate of oven-coke plants was low in 1954, output in Alabama, California, Indiana, Maryland, Texas, Utah, and West Virginia either equaled or exceeded the 1947–49 average. It was quite evident, therefore, that carbonizing capacity increased in these States and that production could have been larger if more coke had been needed.

Pennsylvania—the perennial leader in coke production—again produced the largest tonnage; it comprised over one-fourth of the total oven-coke production and almost three-fourths of the beehive-coke output. Ohio barely retained second place over Indiana, and together these States produced about the same quantity as Pennsylvania. Production of oven coke in Ohio declined 3½ million tons—the largest drop among the oven-coke-producing States. The largest tonnage decrease was in Pennsylvania, where oven-coke production declined 3.2 million tons and beehive-coke output decreased 4.2 million tons. Production also decreased in Illinois, Massachusetts, and New York because a number of coke-oven batteries in these States have been permanently retired in recent years.

Production of coke, by regions, has varied little during the past several years. The Pittsburgh-Youngstown region supplied about one-third of the oven-coke production in 1954, followed by the Eastern region with 22 percent and Chicago with nearly one-fifth of the total.

TABLE 8.—Coke produced in the United States, 1947–49 (average) and 1951–54, by States, in net tons

State	1947–49 (average)	1951	1952	1953	1954
Oven coke:					
Alabama	5, 682, 198	6, 291, 280	5, 712, 102	6, 278, 239	5, 301, 550
California	325, 182	568, 216	610, 080	749, 381	627, 577
Colorado	851, 906	995, 332	816, 140	967, 074	662, 282
Illinois	3, 558, 768	3, 685, 662	3, 390, 773	3, 513, 142	2, 248, 206
Indiana	8, 301, 067	8, 843, 452	7, 611, 090	8, 886, 502	8, 200, 262
Maryland	2, 054, 315	2, 855, 209	2, 490, 859	3, 268, 655	3, 078, 371
Massachusetts	1, 048, 037	1, 108, 826	1, 055, 529	849, 535	516, 344
Michigan	2, 717, 650	2, 920, 082	2, 862, 873	3, 220, 133	2, 308, 924
Minnesota	841, 976	971, 913	868, 523	862, 151	803, 860
New Jersey	1, 396, 082	1, 538, 953	1, 472, 245	1, 175, 416	929, 768
New York	5, 507, 449	5, 610, 975	4, 342, 583	4, 589, 609	3, 578, 703
Ohio	9, 847, 621	11, 151, 201	9, 638, 904	11, 717, 556	8, 228, 873
Pennsylvania	15, 964, 464	17, 250, 217	15, 100, 698	18, 747, 300	15, 566, 002
Tennessee	235, 577	250, 658	254, 319	231, 330	154, 194
Texas	468, 083	755, 418	652, 179	751, 926	699, 536
Utah	978, 701	1, 226, 536	1, 125, 729	1, 407, 818	997, 749
West Virginia	3, 101, 109	3, 829, 879	3, 798, 215	4, 203, 360	3, 708, 905
Connecticut, Kentucky, Missouri, Rhode Island, and Wisconsin	2, 208, 277	2, 133, 363	2, 047, 274	2, 174, 401	1, 450, 336
Total	65, 088, 462	71, 987, 172	63, 850, 115	73, 593, 528	59, 061, 442
Beehive coke:					
Colorado	7, 163	716	600	------	------
Kentucky	81, 871	123, 753	81, 407	62, 500	------
Pennsylvania	4, 848, 550	6, 396, 480	3, 750, 606	4, 635, 513	432, 061
Tennessee	------	1, 638	------	------	------
Utah	129, 680	101, 672	85, 111	83, 863	58, 558
Virginia	190, 200	287, 116	202, 328	188, 033	72, 092
West Virginia	302, 476	432, 155	283, 942	273, 420	38, 343
Total	5, 559, 940	7, 343, 530	4, 403, 994	5, 243, 329	601, 054
Grand total	70, 648, 402	79, 330, 702	68, 254, 109	78, 836, 857	59, 662, 496

TABLE 9.—Oven coke produced in the United States in 1954, by steel-producing districts [1]

District	In existence Dec. 31		Coal carbonized (net tons)	Yield of coke from coal (percent)	Coke produced (net tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Eastern	17	3, 552	18, 359, 983	71. 04	13, 042, 916	$193, 794, 748	$14. 86
Pittsburgh-Youngstown	22	4, 767	29, 482, 024	67. 68	19, 953, 084	283, 693, 940	14. 22
Cleveland-Detroit	10	1, 958	8, 200, 187	71. 46	5, 860, 254	98, 361, 935	16. 78
Chicago	18	3, 251	16, 574, 315	70. 97	11, 762, 300	213, 047, 492	18. 11
Southern	10	1, 573	8, 440, 219	72. 93	6, 155, 280	104, 896, 692	17. 04
Western	4	790	3, 583, 245	63. 84	2, 287, 608	46, 974, 266	20. 53
Total	81	15, 891	84, 639, 973	69. 78	59, 061, 442	940, 769, 073	15. 93

[1] As defined by American Iron and Steel Institute.

COKE BREEZE

TABLE 10.—Coke breeze recovered at coke plants in the United States in 1954, by States

State	Yield per ton of coal [1] (percent)	Produced		Used by producers—				Sold		Wasted (net tons)	On hand Dec. 31 (net tons)
		Net tons	Value	For steam raising		For other purposes [2]		Net tons	Value		
				Net tons	Value	Net tons	Value				
Oven coke:											
Alabama	3.98	288,849	$2,746,173	99,179	(3)	36,522	$377,156	165,948	$1,240,757		23,252
California	5.59	59,675	(3)			43,674	(3)	10,933	(3)		
Colorado	5.74	56,035	(3)			47,973	(3)	6,786	(3)		5,674
Illinois	5.32	170,885	736,720	88,922	$335,238	20,853	92,257	78,197	377,885		36,772
Indiana	4.98	575,819	2,721,599	273,783	1,249,643	162,342	791,546	121,092	630,289		250,115
Maryland	4.74	201,642	(3)	232,093	(3)	29,161	(3)	22	(3)		24,291
Massachusetts	7.24	54,694	(3)	54,664	(3)			30	(3)		
Michigan	4.28	133,889	815,746	60,475	383,016	60,771	(3)	19,247	136,584		6,547
Minnesota	4.68	53,037	226,301	25,599	(3)	12,560	(3)	18,050	(3)		20,733
New Jersey	6.04	78,966	(3)	71,821	(3)			21	(3)		21,953
New York	4.86	251,480	1,376,286	252,083	1,396,157	113,430	609,340	2,601	12,096		76,537
Ohio	4.83	574,073	2,837,597	241,929	1,349,919	189,045	856,730	193,968	871,643		45,274
Pennsylvania	4.29	987,940	3,646,774	851,309	3,036,557	131,857	554,380	88,206	352,607		110,872
Tennessee	5.98	1,928	(3)	437	(3)			31	(3)		1,460
Texas	4.24	41,524	(3)			24,692	(3)	17,554	(3)		241
Utah	6.34	97,493	(3)			76,207	(3)	30,120	(3)		3,355
West Virginia	3.61	186,875	564,216	147,759	427,459	61,408	152,337	46,381	131,257		10,814
Connecticut, Kentucky, Missouri, and Wisconsin	5.78	115,749	682,477	80,528	408,442	70	(3)	42,658	287,934	2,255	25,755
Undistributed			3,610,527		3,325,803		1,792,265		541,806		
Total 1954	4.65	3,930,553	19,964,416	2,480,581	11,912,234	1,010,565	5,226,011	841,845	4,582,858	2,255	[4] 663,645
At merchant plants	4.80	493,536	3,118,282	398,506	2,421,513	15,045	93,765	154,232	1,017,409	2,255	95,296
At furnace plants	4.63	3,437,017	16,846,134	2,082,075	9,490,721	995,520	5,132,246	687,613	3,565,449		568,349
Total 1953	5.02	5,253,487	22,584,533	2,911,918	11,286,201	932,683	3,945,672	1,346,976	7,093,201		857,651
Beehive coke:											
Pennsylvania	2.52	2,955	4,030					14,186	37,838		37
Utah	9.83	10,516	(3)					28,737	(3)		
Virginia	9.63	11,657	(3)					11,416	(3)		403
West Virginia	3.72	2,395	3,667					2,395	3,667		
Undistributed			166,520						271,125		
Total 1954	6.72	27,523	174,217					56,734	312,630		440
Total 1953	2.87	83,456	254,157			13	198	82,027	302,540	[5] 14,327	350

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[1] Computed by dividing production of breeze by coal carbonized at plants actually recovering breeze.

[2] Includes water gas.

[3] Included with "Undistributed" to avoid disclosure of individual company figures.

[4] Includes some breeze resulting from the screening of coke at blast furnaces.

[5] As reported; quantity produced but not used undoubtedly greater. See Mineral Resources of the United States, 1922, pt. II, pp. 726–727.

NUMBER AND TYPE OF OVENS

Slot-Type Coke Ovens.—For the first time in 4 years the number of coke ovens did not increase over those active in the preceding year. In fact, the number of active ovens dropped from 15,989 ovens on January 1, 1954, to 15,891 on December 31. The reduction (98 ovens) was caused by the dismantling and permanent retirement of 866 old ovens, whereas only 768 new ovens were completed and placed in operation. Of the 866 ovens reported as abandoned 472 were dismantled for rebuilding, and 394 were retired permanently. The iron and steel companies have rebuilt old ovens at a relatively high rate since the end of World War II. On the other hand, the operators of merchant-coke plants have done little modernizing in the same period. The percentage of ovens over 25 years old at furnace plants dropped from over 40 percent of the total on December 31, 1948, to less than 33 percent on December 31, 1954. At merchant plants, however, the percentage of ovens over 25 years old has increased substantially. On December 31, 1948, only 38 percent of the ovens at merchant plants were 25 years old or more; this had risen to 64 percent at the end of 1954. Although 25 years is not the maximum life expectancy of coke ovens, past experience has shown that, generally, ovens over 25 years old become increasingly difficult to main-

TABLE 11.—Slot-type coke ovens completed and abandoned in the United States in 1954 and number in existence at end of year, by States

State	Plants in existence Dec. 31	Ovens						
		In existence Dec. 31		New		Abandoned during year[1]	Under construction Dec. 31	
		Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)		Number	Annual coke capacity (net tons)
Alabama	7	1,389	6,359,700	63	409,300	82	20	30,000
California	1	225	1,055,000					
Colorado	1	257	1,220,000			9		
Connecticut	1	70	410,000					
Illinois	8	711	3,071,300			223		
Indiana	5	2,003	9,457,100	154	687,600	41		
Kentucky	1	196	1,038,100					
Maryland	1	687	3,764,000	65	410,000			
Massachusetts	1	108	671,500					
Michigan	4	691	3,891,000	70	483,000			
Minnesota	3	241	1,090,200					
Missouri	1	96	360,000					
New Jersey	2	341	1,506,000					
New York	4	862	4,783,000			111		
Ohio	16	2,533	12,629,700	121	658,600	101	218	1,162,000
Pennsylvania	14	4,017	20,029,600	192	864,900	252	252	1,087,000
Tennessee	1	44	205,900					
Texas	2	140	756,000	15	48,000			
Utah	2	308	1,372,900					
West Virginia	5	772	4,354,500	88	472,900	47		
Wisconsin	1	200	570,100					
Total 1954	81	15,891	78,595.600	768	4,034,300	866	490	2,279,000
At merchant plants	23	2,458	10,686,300			235	44	178,600
At furnace plants	58	13,433	67,909,300	768	4,034,300	631	446	2,100,400
Total 1953	82	15,989	78,258,000	1,027	5,341,500	646	779	4,213,200

[1] Includes ovens dismantled for rebuilding.

tain. The average age of ovens dismantled for rebuilding since 1948 was 27 years. Thus it is evident that the deterioration rate of ovens at merchant plants will increase substantially in the next few years unless a major rebuilding program is undertaken. However, reports submitted to the Bureau of Mines indicated that all but 44 of the 490 coke ovens under construction at the end of 1954 were at furnace plants.

Beehive Ovens.—Tables 13 and 14 show the capacity and number of ovens active in 1954. A total of 12,216 beehive ovens were in existence at 75 plants on December 31, 1954, a decrease of 2,876 ovens and 26 plants from 1953. This change was not significant, however, as operators may report certain ovens in existence one year and not the next, according to industrial activity and general business conditions. Unlike slot-type ovens, which cannot be operated intermittently without damage to brickwork, beehive ovens can easily be started or taken out of production with a minimum of damage, there-

TABLE 12.—Age of slot-type coke ovens in the United States on Dec. 31, 1954[1]

Age	Merchant plants		Furnace plants		Total			
	Number of ovens	Annual coke capacity (net tons)	Number of ovens	Annual coke capacity (net tons)	Number of ovens	Percent of total	Annual coke capacity (net tons)	Percent of total
Under 5 years	190	836,800	3,183	17,238,600	3,373	21.2	18,075,400	23.0
From 5 to 10 years	288	1,271,800	2,179	12,146,800	2,467	15.5	13,418,600	17.1
From 10 to 15 years	315	1,825,900	2,491	13,127,600	2,806	17.7	14,953,500	19.0
From 15 to 20 years	60	280,100	1,098	6,128,300	1,158	7.3	6,408,400	8.2
From 20 to 25 years	37	133,000	82	446,500	119	.7	579,500	.7
From 25 to 30 years	493	2,378,700	754	4,068,200	1,247	7.9	6,446,900	8.2
From 30 to 35 years	125	400,500	464	1,774,700	589	3.7	2,175,200	2.8
From 35 to 40 years	524	2,285,600	3,013	12,412,200	3,537	22.3	14,697,800	18.7
40 years and over	426	1,273,900	169	566,400	595	3.7	1,840,300	2.3
Total	2,458	10,686,300	13,433	67,909,300	15,891	100.0	78,595,600	100.0

[1] Age dates from first entry into operation or from last date of rebuilding.

TABLE 13.—Beehive-coke ovens reconstructed and abandoned in the United States in 1954 and number in existence at end of year, by States

State	Plants in existence Dec. 31	Ovens								
		In existence Dec. 31		In operating condition Dec. 31		Not in operating condition Dec. 31		Rebuilt or repaired	Abandoned or dismantled during year	In course of reconstruction Dec. 31
		Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)			
Kentucky	1	195	120,000	195	120,000	--------	--------	--------	--------	--------
Pennsylvania	63	10,407	7,177,600	9,410	6,582,400	997	595,200	33	1,977	23
Utah	1	297	100,000	297	100,000	--------	--------	--------	500	--------
Virginia	4	482	245,000	427	219,900	55	25,100	--------	366	--------
West Virginia	6	835	435,200	407	182,500	428	252,700	--------	129	--------
Total 1954	75	12,216	8,077,800	10,736	7,204,800	1,480	873,000	33	[1] 2,972	23
Total 1953	101	15,092	10,072,700	13,097	8,886,800	1,995	1,185,900	105	[1] 2,564	22

[1] Idle and not expected to resume production; removed from list of available ovens.

fore the number of beehives in existence fluctuated widely in recent years, depending upon activity in the iron and steel industry.

The lower blast-furnace operating rates in 1954 curtailed coke requirements, and few beehive plants could continue operations. The average number of active ovens each month is given in table 14. There was little change in active ovens in the last 10 months of 1954. The December average, although slightly higher than in October and November, was less than one-third that in January.

TABLE 14.—Average number of beehive-coke ovens active in the United States in 1954, by months

Month	Number	Month	Number	Month	Number
January	5,385	May	1,337	September	1,485
February	2,945	June	1,338	October	1,373
March	1,485	July	1,383	November	1,390
April	1,414	August	1,446	December	1,572

CAPACITY OF OVEN-COKE PLANTS

The potential annual coke capacity of slot-type coke ovens increased slightly during 1954 and was 78,595,600 net tons at the close of the year; this was 7 percent higher than the capacity in 1949 and represented a gain of more than 1 percent annually. Whereas, the capacity of furnace oven-coke plants has increased since 1949, that of merchant plants has decreased nearly 5 percent each year in the same period.

The potential annual coke capacity reported to the Bureau of Mines by the operating companies is based on the minimum coking time necessary to produce a coke with qualities suitable for its intended use. For this reason, the potential capacity of a plant may change from year to year, depending on the age and condition of ovens, the character and quality of coal carbonized, the grade of coke required, and other economic factors. Thus the capacity reported to the Bureau of Mines may differ from the designed or rated capacity estimated by the coke-oven builder at the time of construction. For example, if a coking rate of 1 inch per hour is used to calculate the capacity (the generally accepted standard used by coke-oven builders) the capacity of slot-type coke ovens on December 31, 1954, would have been 81,684,500 net tons or 4 percent higher than the capacity reported to the Bureau of Mines. However, because of factors previously mentioned, the maximum potential capacity reported to the Bureau of Mines and shown in table 15 is probably a reliable measure of the practical operating capacity for the years given.

Table 16 shows the monthly rate of coke-oven operations for the past 5 years. The data for 1954 indicate a sharp recession in oven operations from the high rates maintained in preceding years. Operating rates dropped steadily during the first part of the year to 68 percent of capacity in August, the lowest since July 1952. The demand for coke increased in September, and coke-oven production increased accordingly in succeeding months and in December reached 84 percent, the highest for the year. This figure, however, was 12 points below the rate of production in January 1953 and 14 points below the record of June 1951.

TABLE 15.—Potential maximum annual coke capacity of all oven-coke plants in existence in the United States, 1949 and 1951–54

Year	Merchant plants				Furnace plants				Total			
	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)
	Plants	Ovens			Plants	Ovens			Plants	Ovens		
1949	30	3,057	14,209,200	------	55	12,047	59,500,900	------	85	15,104	73,710,100	------
1951	27	2,958	13,535,500	−4.7	56	12,361	60,692,900	+2.0	83	15,319	74,228,400	+0.7
1952	25	2,781	12,779,700	−10.1	57	12,827	63,648,300	+7.0	82	15,608	76,428,000	+3.7
1953	24	2,693	12,090,900	−14.9	58	13,296	66,167,100	+11.2	82	15,989	78,258,000	+6.2
1954	23	2,458	10,686,300	−24.8	58	13,433	67,909,300	+14.1	81	15,891	78,595,600	+6.6

TABLE 16.—Relationship of production to potential maximum capacity [1] at oven-coke plants in the United States, 1950–54, by months, in percent

Month	1950	1951	1952	1953	1954	Month	1950	1951	1952	1953	1954
January	85.6	97.8	97.7	96.8	82.6	August	91.8	96.5	90.2	93.5	67.9
February	70.0	95.5	97.7	96.4	78.4	September	94.0	96.2	92.9	92.5	69.8
March	79.3	96.2	97.7	95.8	75.0	October	96.2	95.4	94.3	91.8	76.6
April	92.9	96.7	86.5	93.9	70.6	November	93.8	95.3	95.0	89.6	81.4
May	92.7	97.6	86.1	93.8	70.0	December	95.8	95.8	95.7	85.0	84.4
June	92.4	97.9	38.1	94.3	70.4						
July	93.7	97.3	36.1	93.9	69.6	Year	90.0	96.5	84.0	93.1	74.7

[1] Capacity of all ovens in existence, whether active or idle, based upon maximum daily capacity times days in month.

QUANTITY AND VALUE OF COAL CARBONIZED

The quantity of coal charged into coke ovens (slot-type and beehive) in 1954 decreased 24 percent from 1953 and was the smallest carbonized in 8 years. Consumption of coal by slot-type ovens decreased 20.2 million tons, and consumption at beehive plants was the lowest on record. As a result, coke ovens yielded first place, among the major coal-consuming groups, to the electric-power utilities. Normally, coal consumption at coke ovens shows only small differences in seasonal consumption pattern. For example, for the 1947–49 period the fluctuation from the highest to the lowest month was only about 4 points. Beginning in the first quarter of 1954, however, the sharp recession in steel production was reflected in coking-coal consumption, which dropped from 8 million tons in January to 6.4 million in September. Consumption increased slowly but steadily in the last quarter and in December nearly equaled that in January. Anthracite fines were used at 20 oven-coke plants, and 229,373 tons was blended with bituminous coal in the coke industry in 1954.

One less State consumed coking coal in 1954, as Rhode Island consumed none after the Providence Gas Co. plant was closed in 1953. Although the geographic pattern of coking-coal consumption has been rather well established over the years, there was evidence of some shifting, particularly among the States along the eastern seaboard, because of the inroads made by oil and natural gas into the markets formerly served by coke ovens. The 1953–54 data do not illustrate this trend because of the general recession in coke production. However, if compared with 1947–49, coal consumption dropped almost 50 percent at plants along the Atlantic seaboard. Although coal-carbonizing capacity in Maryland and around Buffalo, N. Y., has increased, the gain has not offset the losses in Rhode Island, Massachusetts, eastern New York, and New Jersey, and coking-coal consumption in the eastern part of the United States has trended downward.

Pennsylvania, which lost 10,815,652 tons in coking-coal consumption from 1953, still carbonized 27 percent of the coal charged into slot-type ovens and 68 percent of the coal charged into beehives. Slot-type ovens in Ohio and Indiana together carbonized only about the same quantity as was used in all ovens in Pennsylvania, as coal consumption in Ohio fell 29 percent. Other States where over 5 million tons of coal was carbonized were Alabama, West Virginia, and New York.

Coal costs represent 75 to 80 percent of the total coke-manufacturing costs, which, in turn, represent a substantial part of costs of making pig iron in blast furnaces. As blast furnaces use a preponderance of all coke produced in the United States, coal costs are extremely important to coke-plant and blast-furnace operators. For the first time since 1940, the reported value of coal delivered to oven-coke plants decreased slightly. In the oven-coke industry many plants are farther from the coal fields, and coal costs are much higher because of the added transportation expense. Table 20 indicates that the value of coal is much lower for Alabama and West Virginia, where the ovens are near the sources of coal, than for Indiana, Illinois, New York, and Minnesota. The differences among States are even larger when the costs of coal required for 1 ton of coke are used, because 1.43 tons of coal is required.

Although the value of coal carbonized in slot-type ovens declined in 1954, that of beehive coal continued to rise and reached $6.44, a new high, or about twice the value reported as late as 1944. In beehive coking the yield of marketable coke is not as large as for slot-type ovens, so that more coal is required to make 1 ton of coke. This,

TABLE 17.—Bituminous coal carbonized in coke ovens in the United States, 1947–49 (average) and 1953–54, by months, in net tons

Month	1947–49 (average)			1953			1954		
	Slot type	Beehive	Total	Slot type	Beehive	Total	Slot type	Beehive	Total
Jan	8, 320, 100	987, 400	9, 307, 500	8, 960, 200	759, 700	9, 719, 900	8, 048, 400	257, 800	8, 306, 200
Feb	7, 647, 600	906, 500	8, 554, 100	8, 101, 800	733, 300	8, 835, 100	6, 903, 900	104, 000	7, 007, 900
Mar	8, 195, 000	726, 000	8, 921, 000	8, 993, 600	867, 100	9, 860, 700	7, 301, 700	57, 900	7, 359, 600
Apr	7, 448, 200	700, 900	8, 149, 100	8, 620, 000	820, 000	9, 440, 000	6, 661, 200	61, 400	6, 722, 600
May	8, 096, 100	905, 800	9, 001, 900	9, 030, 700	866, 000	9, 896, 700	6, 813, 800	53, 500	6, 867, 300
June	7, 697, 200	673, 900	8, 371, 100	8, 762, 900	790, 700	9, 553, 600	6, 593, 600	54, 800	6, 648, 400
July	7, 631, 400	482, 200	8, 113, 600	9, 074, 000	649, 400	9, 723, 400	6, 581, 300	56, 100	6, 637, 400
Aug	7, 901, 400	665, 500	8, 566, 900	8, 985, 200	661, 000	9, 646, 200	6, 427, 300	72, 700	6, 500, 000
Sept	7, 617, 700	645, 000	8, 262, 700	8, 591, 200	587, 300	9, 178, 500	6, 395, 200	68, 000	6, 463, 200
Oct	6, 397, 800	669, 100	7, 066, 900	8, 802, 200	567, 300	9, 369, 500	7, 245, 400	54, 800	7, 300, 200
Nov	7, 118, 300	641, 900	7, 760, 200	8, 387, 000	478, 400	8, 865, 400	7, 443, 700	66, 300	7, 510, 000
Dec	8, 326, 100	712, 700	9, 038, 800	8, 339, 500	445, 900	8, 785, 400	7, 995, 100	72, 300	8, 067, 400
Total	92, 396, 900	8, 716, 900	101, 113, 800	104, 648, 300	8, 226, 100	112, 874, 400	84, 410, 600	979, 600	85, 390, 200

of course, increases the cost of coal required for each ton of beehive coke and narrows the margin in coal costs between beehive and slot-type coke ovens. For example, the difference in the average values of bituminous coal for making oven and beehive coke was $2.56 per net ton. However, if the costs are based on the quantity of coal required

TABLE 18.—Anthracite carbonized at oven-coke plants in the United States, 1947–49 (average) and 1951–54, by months, in net tons

Month	1947–49 (average)	1951	1952	1953	1954
January	17,600	13,500	18,400	18,900	24,900
February	16,600	12,000	16,800	17.500	21,600
March	19,300	18,800	16,600	21,500	20,900
April	21,500	22,600	16,600	22,800	19,400
May	18,800	23,900	18,100	26,300	18,800
June	19,800	21,000	16,400	24,300	16,700
July	18,200	20,500	14,400	24,500	15,600
August	18,900	19,100	14,900	24,500	17,300
September	20,100	20,000	15,200	20,800	16,600
October	22,000	23,300	18,000	22,900	19,100
November	20,900	22,800	23,400	23,700	18,700
December	16,700	19,600	18,100	26,900	19,800
Total	230,400	237,100	206,900	274,600	229,400

TABLE 19.—Quantity and value at ovens of coal carbonized in the United States in 1954, by States

State	Coal carbonized (net tons)	Value of coal		Coal per ton of coke	
		Total	Per ton	Net tons	Value
Oven coke:					
Alabama	7,265,403	$48,581,794	$6.69	1.37	$9.16
California	1,068,156	(1)	(1)	1.70	(1)
Colorado	976,495	(1)	(1)	1.47	(1)
Illinois	3,209,485	32,187,392	10.03	1.43	14.32
Indiana	11,570,447	121,472,729	10.50	1.41	14.81
Maryland	4,252,947	(1)	(1)	1.38	(1)
Massachusetts	755,456	(1)	(1)	1.46	(1)
Michigan	3,129,883	28,263,967	9.03	1.36	12.24
Minnesota	1,134,362	11,718,756	10.33	1.41	14.58
New Jersey	1,307,844	(1)	(1)	1.41	(1)
New York	5,178,791	54,308,615	10.49	1.45	15.18
Ohio	11,877,465	105,168,645	8.85	1.44	12.78
Pennsylvania	23,013,594	185,227,710	8.05	1.48	11.90
Tennessee	194,714	(1)	(1)	1.26	(1)
Texas	980,102	(1)	(1)	1.40	(1)
Utah	1,538,594	(1)	(1)	1.54	(1)
West Virginia	5,183,406	36,078,563	6.96	1.40	9.73
Connecticut, Kentucky, Missouri, and Wisconsin	2,002,829	18,866,098	9.42	1.38	13.01
Undistributed		119,641,986	10.80		15.61
Total 1954	84,639,973	761,516,255	9.00	1.43	12.89
At merchant plants	10,277,302	98,236,497	9.56	1.40	13.34
At furnace plants	74,362,671	663,279,758	8.92	1.44	12.83
Total 1953	104,922,927	969,308,368	9.24	1.43	13.17
Beehive coke:					
Pennsylvania	668,179	4,161,353	6.23	1.55	9.63
Utah	106,976	(1)	(1)	1.83	(1)
Virginia	140,195	842,816	6.01	1.94	11.69
West Virginia	64,296	(1)	(1)	1.68	(1)
Undistributed		1,300,487	7.59		13.42
Total 1954	979,646	6,304,656	6.44	1.63	10.49
Total 1953	8,226,097	52,283,334	6.36	1.57	9.97

[1] Included with "Undistributed" to avoid disclosure of individual company figures.

to make 1 ton of coke, the difference was $2.40. Although the decrease in margin appears small, it is significant when based on 4 or 5 million tons of coke.

TABLE 20.—Average value per net ton of coal carbonized at oven-coke plants in the United States, 1947–49 (average) and 1951–54, by States

State	1947–49 (average)	1951	1952	1953	1954
Alabama	$6.27	$7.39	$7.06	$6.93	$6.69
Illinois	9.00	10.25	10.59	10.62	10.03
Indiana	8.99	10.13	11.33	10.54	10.50
Michigan	7.98	9.18	9.52	9.71	9.03
Minnesota	9.40	10.44	10.61	10.76	10.33
New York	9.00	10.15	10.33	10.63	10.49
Ohio	7.75	8.70	8.96	9.21	8.85
Pennsylvania	6.88	8.02	8.06	8.11	8.05
West Virginia	5.79	6.54	7.13	7.28	6.96
Other States [1]	8.58	10.10	10.58	10.89	10.59
United States average	7.79	8.94	9.23	9.24	9.00
Value of coal per ton of coke	11.09	12.70	13.14	13.17	12.89

[1] California, Colorado, Connecticut, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, Rhode Island, Tennessee, Texas, Utah, and Wisconsin.

TABLE 21.—Value of coal and products per net ton of coal carbonized in the United States, 1947–49 (average) and 1951–54

Year	Oven coke					Beehive coke	
	Value of coal per ton	Value per ton of coal				Value of coal per ton	Value per ton of coal
		Coke produced	Breeze produced	Coal-chemical materials used or sold [1]	Total		
1947–49 (average)	$7.79	$8.49	$0.19	$2.75	$11.43	$4.90	$7.22
1951	8.94	9.94	.19	3.28	13.41	6.15	8.97
1952	9.23	10.18	.20	3.31	13.69	6.26	8.87
1953	9.24	10.30	.21	3.43	13.94	6.36	9.27
1954	9.00	11.12	.23	3.64	14.99	6.44	8.69

[1] Includes value of surplus gas and tar burned.

PREPARATION AND SOURCE OF COAL

Washed and Unwashed Coal.—One of the significant developments in the coke industry in the past decade has been the improvement in coal quality because of better cleaning processes and equipment. The coke industry, probably more than any other, maintains rigid specifications for the coal carbonized. In 1954, 68 percent of the bituminous coal charged into coke ovens was cleaned, compared with 28 percent in 1945. The reason for this tremendous increase is obvious, as coke quality depends to a much greater degree upon the character and quality of coal carbonized than upon oven design or carbonizing technique. Although mechanization of American bituminous-coal mines has increased productivity, it has also increased the refuse content of the coal, which has made it necessary to clean the raw coal in many areas. For example, at the end of World War II, Illinois, Indiana, Michigan, Minnesota, New Jersey, New York, and Ohio, used either small quantities of washed coal or none. In the past decade the proportion of washed coal carbonized in Illinois increased from 22 percent in 1945 to 58 in 1954; Indiana, from less than 1 percent to 88; Michigan, from 6 percent to 46; Minnesota and New Jersey, from none to 48 percent each; New York, from 10 percent to 65; Ohio, from 25 percent to 70; Pennsylvania, from 40 percent to 74; and West Virginia, from 37 percent to 58.

All coal mined in Alabama and Colorado used to manufacture coke was washed before it was charged into ovens. Most of the cleaning or washing of coal is done at the mines, although several coke plants operate coal-cleaning facilities adjacent to the ovens.

Source.—The bituminous-coal fields in the Appalachian region supply most of the coal carbonized in the United States. Coal fields in West Virginia and Pennsylvania supplied about three-fourths of the coking coal shipped to oven-coke plants in 1954. Of significance is the fact that the largest supplies of low-volatile coal, which is blended with high-volatile to improve the physical properties of metallurgical coke, particularly its strength, comes from these States, largely from West Virginia. The famous Pocohontas field produces some of the finest coking coal mined in the United States. The importance that coke-oven operators place on the blending of low-volatile coals may be noted from the fact that coke plants in the West and on the Pacific coast ship in this type of coal from the Oklahoma-Arkansas coal fields. Kentucky has been increasing its shipments of coking coal to coke plants and supplied almost 10 million tons or 12 percent of the total quantity obtained by coke-plant operators. Coal fields of Alabama supply the coke plants within the State, and shipments amounted to 8 percent of the United States total. Other States that contributed significant tonnages of coking coal in 1954 were Utah, Virginia, and Colorado.

The origin and destination of coking-coal shipments to oven-coke plants in 1954 are summarized in table 24. West Virginia—the leading coking-coal producer and distributor shipped coal to 17 other States. Of the total tonnage originating in this State, all but 9 percent was shipped outside the State. Pennsylvania, the perennial leader among the coal-consuming States, ranked very close to West Virginia in the quantity of coal produced in the State. However, unlike West Virginia, where only a small quantity of the coal is carbonized within the State, Pennsylvania consumed 63 percent. Kentucky, which ranked third in production, shipped virtually all of its coal to other States, as did Virginia.

About two-thirds of the coal carbonized in slot-type coke ovens in 1954 was produced in mines owned and operated by coke-producing companies. This is known as captive coal, and its use has increased substantially in recent years. One of the reasons for the upward trend in the use of captive coal is that coke-oven operators can maintain better control of quality and be assured of an adequate supply during periods of heavy demand. Furnace plants operated by the iron and steel industry draw a greater proportion of their requirements from captive mines than do the merchant-coke plants. Merchant plants, however, have shown a larger percentage increase in the use of captive coal in the past 5 years, than have furnace plants. Captive coal obtained by merchant plants increased from 29 percent in the 1947–49 period to 42 percent for 1954. In the same period captive coal received by furnace-coke plants increased from 64 percent to 70.

Blending.—Blending or mixing various types of coal before charging it into ovens is an integral part of coal preparation at virtually all oven-coke plants. Many coke plants received coal from numerous mines and different coal-producing fields. The quality of coal varies widely from field to field and within the same field, and ample mixing facilities are necessary to obtain a uniform quality. A better coke can be obtained by a proper blend of 2, 3, or more different coals than from any 1 alone. The primary objective of blending is to produce economically a quality of coke satisfactory for the use intended. It also permits using coals that have good coking properties but may be otherwise objectionable from the standpoint of excessive ash, sulfur, or phosphorus content and cannot be used alone as a 100-percent charge. Thus, in addition to providing a means of controlling the quality and strength of the coke and the yield of coproducts, blending permits flexible operation at oven-coke plants and use of a wider variety of coking coals. All oven-coke plants mix or blend coals before charging them into ovens; however, coal of different volatile content was mixed at only 77 of the 82 active oven-coke plants in 1954. Of these, 55 used high- and low-volatile coals; 19, high-medium-, and low-volatile; 1, high- and medium-volatile; and 2, low- and medium-volatile. Of those that did not mix coals of different volatile content, 1 plant used straight high-volatile and 4 used medium-volatile. The proportion of the different volatile contents of coal mixed before charging into ovens varies widely from plant to plant,

TABLE 22.—Washed and unwashed coal carbonized in the United States in 1954, by States in which used, in net tons

State	Slot-type ovens				Beehive ovens		
	Bituminous		Anthracite	Total	Bituminous		
	Washed	Unwashed			Washed	Unwashed	Total
Alabama	6, 957, 063	300, 376	7, 964	7, 265, 403			
California	900, 746	167, 410		1, 068, 156			
Colorado	976, 495			976, 495			
Illinois	1, 849, 281	1, 346, 711	13, 493	3, 209, 485			
Indiana	10, 156, 916	1, 393, 472	20, 059	11, 570, 447			
Maryland		4, 252, 947		4, 252, 947			
Massachusetts		739, 436	16, 020	755, 456			
Michigan	1, 432, 149	1, 666, 619	31, 115	3, 129, 883			
Minnesota	531, 812	587, 342	15, 208	1, 134, 362			
New Jersey	625, 233	667, 948	14, 663	1, 307, 844			
New York	3, 362, 108	1, 813, 057	3, 626	5, 178, 791			
Ohio	8, 241, 133	3, 614, 840	21, 492	11, 877, 465			
Pennsylvania	16, 909, 878	6, 059, 574	44, 142	23, 013, 594	199, 458	468, 721	668, 179
Tennessee		192, 034	2, 680	194, 714			
Texas	652, 953	327, 149		980, 102			
Utah	4, 678	1, 533, 916		1, 538, 594	106, 976		106, 976
Virginia					80, 009	60, 186	140, 195
West Virginia	3, 004, 665	2, 178, 741		5, 183, 406		64, 296	64, 296
Connecticut, Kentucky, Missouri, and Wisconsin	1, 713, 785	250, 133	38, 911	2, 002, 829			
Total 1954	57, 318, 895	27, 091, 705	229, 373	84, 639, 973	386, 443	593, 203	979, 646
At merchant plants	5, 616, 420	4, 478, 726	182, 156	10, 277, 302			
At furnace plants	51, 702, 475	22, 612, 979	47, 217	74, 362, 671			
Total 1953	63, 206, 898	41, 441, 432	274, 597	104,922,927	3, 244, 008	4, 982, 089	8, 226, 097

according to local conditions. In 1954 the proportion of low-volatile coal used in coke-plant admixtures ranged from less than 1 percent to 56.

TABLE 23.—Origin of coal shipped to oven-coke plants in the United States in 1954, by producing fields and volatile content, in net tons

State and field[1] where coal was produced	Volatile content[2]			Total
	High	Medium	Low	
Alabama	361,609	6,546,382		6,907,991
Arkansas			210,581	210,581
Colorado	1,026,696	89,393		1,116,089
Illinois	276,082			276,082
Indiana	4,206			4,206
Kentucky:				
Elkhorn	4,740,473			4,740,473
Harlan	4,441,585			4,441,585
Kenova-Thacker	429,236			429,236
New Mexico	61,743			61,743
Oklahoma	523,293	337,716	339,141	1,200,150
Pennsylvania:				
Anthracite			204,628	204,628
Bituminous:				
Central Pennsylvania	1,338,087	96,411	3,721,857	5,156,355
Connellsville	12,274,111			12,274,111
Freeport	2,623,895			2,623,895
Pittsburgh	8,990,406			8,990,406
Somerset			213,136	213,136
Westmoreland	253,439			253,439
Tennessee		84,324		84,324
Utah	1,884,799			1,884,799
Virginia:				
Buchanan	292,861	35,806		328,667
Clinch Valley	109,506	30,412		139,918
Pocahontas			252	252
Southwestern	1,109,254			1,109,254
Washington		2,663		2,663
West Virginia:				
Coal River	428,974			428,974
Fairmont	4,810,957			4,810,957
Kanawha	4,161,928	410,954		4,572,882
Kenova-Thacker	117,155			117,155
Logan	3,583,684	292,913		3,876,597
New River	340,222	322,037	253,030	915,289
Pocahontas			11,290,886	11,290,886
Randolph-Barbour	457,952	177,128		635,080
Tug River			321,484	321,484
Webster-Gauley	679,034	704,036		1,383,070
Winding Gulf		36,860	2,242,676	2,279,536
Total	55,321,187	9,167,035	18,797,671	83,285,893

[1] As defined by the United States Coal Commission of 1922.

[2] High-volatile—dry volatile matter over 31 percent; medium-volatile—dry volatile matter 31 percent or less and over 22 percent; low-volatile—dry volatile matter 22 percent or less and over 14 precent.

TABLE 24.—Origin and destination of coal shipped to oven-coke plants in the United States in 1954, by States, in net tons

Coal consumed in—	Coal produced in—														
	Alabama	Arkansas	Colorado	Illinois	Indiana	Kentucky	New Mexico	Oklahoma	Pennsylvania	Tennessee	Utah	Virginia	Washington	West Virginia	Total
Alabama:															
Merchant plants	579,156	------	------	------	------	------	------	------	8,305	------	------	------	------	147,889	735,350
Furnace plants	6,244,486	------	------	------	------	------	------	------	------	------	------	------	------	27,423	6,271,909
Total Alabama	6,823,642	------	------	------	------	------	------	------	8,305	------	------	------	------	175,312	7,007,259
California: Furnace plant	------	32,140	206	------	------	------	5,886	124,277	------	------	824,963	------	------	------	987,472
Colorado: Furnace plant	------	135,673	944,261	------	------	------	55,857	------	------	------	------	------	------	------	1,135,791
Illinois:															
Merchant plants	------	------	------	------	------	7,942	------	------	13,124	------	------	10,809	------	240,468	272,343
Furnace plants	------	------	------	266,372	------	1,386,616	------	------	------	------	------	109,910	------	986,612	2,749,510
Total Illinois	------	------	------	266,372	------	1,394,558	------	------	13,124	------	------	120,719	------	1,227,080	3,021,853
Indiana:															
Merchant plants	------	------	------	------	4,206	------	------	------	15,724	------	------	30,412	------	559,352	609,694
Furnace plants	------	------	------	9,710	------	4,919,211	------	------	------	------	------	113,366	------	5,882,190	10,924,477
Total Indiana	------	------	------	9,710	4,206	4,919,211	------	------	15,724	------	------	143,778	------	6,441,542	11,534,171
Maryland: Furnace plant	------	------	------	------	------	------	------	------	755,029	------	------	47,039	------	3,393,283	4,195,351
Massachusetts: Merchant plant	------	------	------	------	------	482	------	------	13,027	------	------	------	------	738,954	752,463
Michigan:															
Merchant plants	------	------	------	------	------	234	------	------	5,101	------	------	21,316	------	557,337	583,988
Furnace plants	------	------	------	------	------	1,131,685	------	------	246,423	------	------	212,938	------	892,161	2,483,207
Total Michigan	------	------	------	------	------	1,131,919	------	------	251,524	------	------	234,254	------	1,449,498	3,067,195
Minnesota:															
Merchant plant	------	------	------	------	------	------	------	------	14,700	------	------	------	------	189,235	203,935
Furnace plants	------	------	------	------	------	420,608	------	------	------	------	------	------	------	510,475	931,083
Total Minnesota	------	------	------	------	------	420,608	------	------	14,700	------	------	------	------	699,710	1,135,018
New Jersey: Merchant plants	------	------	------	------	------	14,184	------	------	13,238	------	------	86,417	------	1,193,556	1,307,395
New York:															
Merchant plants	------	------	------	------	------	56,669	------	------	116,014	------	------	124,414	------	656,410	953,507
Furnace plants	------	------	------	------	------	217,060	------	------	2,733,982	------	------	342,186	------	850,354	4,143,582
Total New York	------	------	------	------	------	273,729	------	------	2,849,996	------	------	466,600	------	1,506,764	5,097,089

TABLE 24.—Origin and destination of coal shipped to oven-coke plants in the United States in 1954, by States, in net tons—Con.

Coal consumed in—	Coal produced in—														
	Alabama	Arkansas	Colorado	Illinois	Indiana	Kentucky	New Mexico	Oklahoma	Pennsylvania	Tennessee	Utah	Virginia	Washington	West Virginia	Total
Ohio:															
Merchant plants									14,854			43,526		874,172	932,552
Furnace plants						1,277,495			4,455,021			253,179		4,828,344	10,814,039
Total Ohio						1,277,495			4,469,875			296,705		5,702,516	11,746,591
Pennsylvania:															
Merchant plants									29,924					540,040	569,964
Furnace plants						164,733			18,828,014			23,959		3,096,288	22,112,994
Total Pennsylvania						164,733			18,857,938			23,959		3,636,328	22,682,958
Tennessee: Furnace plant									3,120	84,324		85,986		38,777	212,207
Texas: Furnace plants	84,349							887,116							971,465
Utah: Furnace plants		42,768	171,622					188,757			1,059,836		2,663	267	1,465,913
West Virginia:															
Merchant plants									51,113					940,974	992,087
Furnace plants									2,364,323					1,852,380	4,216,703
Total West Virginia									2,415,436					2,793,354	5,208,790
Connecticut, Kentucky, Missouri, and Wisconsin: Merchant plants						14,375			34,934			72,634		1,634,969	1,756,912
Grand total	6,907,991	210,581	1,116,089	276,082	4,206	9,611,294	61,743	1,200,150	29,715,970	84,324	1,884,799	1,578,091	2,663	30,631,910	83,285,893
At merchant plants	579,156				4,206	93,886			330,058			389,528		8,273,356	9,670,190
At furnace plants	6,328,835	210,581	1,116,089	276,082		9,517,408	61,743	1,200,150	29,385,912	84,324	1,884,799	1,188,563	2,663	22,358,554	73,615,703

TABLE 25.—Coal shipped to oven-coke plants in the United States in 1954, by consuming States and volatile content,[1] in net tons

Coal consumed in—	High-volatile		Medium-volatile		Low-volatile		Total coal received (net tons)
	Net tons	Percent of total	Net tons	Percent of total	Net tons	Percent of total	
Alabama:							
Merchant plants	259,644	35.3	319,512	43.5	156,194	21.2	735,350
Furnace plants	17,616	0.3	6,226,870	99.3	27,423	0.4	6,271,909
Total Alabama	277,260	4.0	6,546,382	93.4	183,617	2.6	7,007,259
California: Furnace plant	831,055	84.2	----	----	156,417	15.8	987,472
Colorado: Furnace plant	1,000,118	88.1	----	----	135,673	11.9	1,135,791
Illinois:							
Merchant plants	51,461	18.9	108,984	40.0	111,898	41.1	272,343
Furnace plants	2,022,307	73.6	----	----	727,203	26.4	2,749,510
Total Illinois	2,073,768	68.6	108,984	3.6	839,101	27.8	3,021,853
Indiana:							
Merchant plants	275,084	45.1	67,272	11.0	267,338	43.9	609,694
Furnace plants	5,809,331	53.2	----	----	5,115,146	46.8	10,924,477
Total Indiana	6,084,415	52.7	67,272	0.6	5,382,484	46.7	11,534,171
Maryland: Furnace plant	2,755,670	65.7	----	----	1,439,681	34.3	4,195,351
Massachusetts: Merchant plant	392,440	52.1	194,077	25.8	165,946	22.1	752,463
Michigan:							
Merchant plants	336,813	57.7	----	----	247,175	42.3	583,988
Furnace plants	1,762,388	71.0	----	----	720,819	29.0	2,483,207
Total Michigan	2,099,201	68.4	----	----	967,994	31.6	3,067,195
Minnesota:							
Merchant plant	45,923	22.5	73,229	35.9	84,783	41.6	203,935
Furnace plants	606,938	65.2	87,600	9.4	236,545	25.4	931,083
Total Minnesota	652,861	57.5	160,829	14.2	321,328	28.3	1,135,018
New Jersey: Merchant plants	739,863	56.6	205,125	15.7	362,407	27.7	1,307,395
New York:							
Merchant plants	717,118	75.2	----	----	236,389	24.8	953,507
Furnace plants	2,800,428	67.6	177,519	4.3	1,165,635	28.1	4,143,582
Total New York	3,517,546	69.0	177,519	3.5	1,402,024	27.5	5,097,089
Ohio:							
Merchant plants	484,189	51.9	122,552	13.2	325,811	34.9	932,552
Furnace plants	8,066,309	74.6	149,204	1.4	2,598,526	24.0	10,814,039
Total Ohio	8,550,498	72.8	271,756	2.3	2,924,337	24.9	11,746,591
Pennsylvania:							
Merchant plants	255,344	44.8	188,493	33.1	126,127	22.1	569,964
Furnace plants	18,814,634	85.1	545,480	2.5	2,752,880	12.4	22,112,994
Total Pennsylvania	19,069,978	84.1	733,973	3.2	2,879,007	12.7	22,682,958
Tennessee: Furnace plant	50,180	23.6	120,130	56.6	41,897	19.8	212,207
Texas: Furnace plants	607,642	62.5	239,574	24.7	124,249	12.8	971,465
Utah: Furnace plants	1,142,065	77.9	190,198	13.0	133,650	9.1	1,465,913
West Virginia:							
Merchant plants	940,904	94.8	----	----	51,183	5.2	992,087
Furnace plants	3,545,922	84.1	----	----	670,781	15.9	4,216,703
Total West Virginia	4,486,826	86.1	----	----	721,964	13.9	5,208,790
Connecticut, Kentucky, Missouri, and Wisconsin: Merchant plants	989,801	56.3	151,216	8.6	615,895	35.1	1,756,912
Grand total	55,321,187	66.4	9,167,035	11.0	18,797,671	22.6	83,285,893
At merchant plants	5,488,584	56.7	1,430,460	14.8	2,751,146	28.5	9,670,190
At furnace plants	49,832,603	67.7	7,736,575	10.5	16,046,525	21.8	73,615,703

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[1] High-volatile—dry volatile matter over 31 percent; medium-volatile—dry volatile matter 31 percent or less and over 22 percent; low-volatile—dry volatile matter 22 percent or less and over 14 percent.

TABLE 26.—Quantity and percentage of captive coal received by oven-coke plants in the United States, 1947–49 (average) and 1951–54

Year	At merchant plants			At furnace plants			Total		
	Total coal received	Captive coal		Total coal received	Captive coal		Total coal received	Captive coal	
		Quantity	Percent		Quantity	Percent		Quantity	Percent
1947–49 (average)	18,321,004	5,286,361	28.9	76,138,301	48,371,093	63.5	94,459,305	53,657,454	56.8
1951	18,043,398	6,057,169	33.6	84,536,657	52,471,260	62.1	102,580,055	58,528,429	57.1
1952	15,747,658	5,542,423	35.2	75,452,183	47,290,610	62.7	91,199,841	52,833,033	57.9
1953	15,365,899	5,923,998	38.6	90,710,334	60,121,968	66.3	106,076,233	66,045,966	62.3
1954	9,670,190	4,049,080	41.9	73,615,703	51,828,722	70.4	83,285,893	55,877,802	67.1

CONSUMPTION OF COKE

The general decline in industrial activity in 1954 reduced coke requirements accordingly and the apparent coke consumption of the United States dropped 18,571,104 tons to 59,124,768, the lowest figure since 1946. Although consumption of coke in iron furnaces in 1954 was 7 percent lower than for the 1947–49 period, the largest decrease was in coke classified for all other purposes (table 27). In 1954 the tonnage consumed for all other purposes was almost 50 percent less than the 1947–49 average because of the loss of the home-heating and gas-manufacturing markets to natural gas and oil.

The fuel efficiency of blast furnaces continued to improve in 1954, and the quantity of coke required per ton of pig iron produced was the lowest since 1941. According to the American Iron and Steel Institute, 1,745.2 pounds of coke was needed to make 1 ton of pig iron in 1941 compared with 1,745.7 in 1954. The decline of 66.9 pounds from the 1953 rate was the largest annual decrease since 1925. Factors responsible for the decline included the improvement in quality of both coal and iron ore, expanded sintering facilities, and advancement in operating techniques of the blast furnaces.

Data on the production and distribution of coke by major end-uses in 1954 are shown in tables 29 and 30. The format of these two tables has been revised from those of preceding years. In previous years sales of coke to financially affiliated companies were included with commercial sales. In some instances these shipments were merely intercompany transfers and the values assigned were not those prevailing on the market but values assigned according to the accounting procedures of the companies involved. Therefore, to differentiate between commercial sales and intercompany transfers the questionnaires were revised in January 1954, and intercompany transfers are no longer shown with sales but included under coke reported as used by the producing company. In this way sales data reflect the quantity of coke that actually changes ownership.

Table 29 shows that the furnace oven-coke plants used virtually all of the coke they produced. Although some of the merchant plants, particularly those connected with chemical works, consume most of their output, most merchant plants market virtually all of their coke. Merchant plants over the years have supplied the coke requirements of small pig-iron producers, iron foundries, nonferrous smelters, chemical processors, and fuel retailers and home owners. In 1954 the merchant oven-coke plants used 27 percent of their total distribution in their own oven operations and shipped the balance to other consumers. Of the quantity shipped to other consumers, 17 percent was sold to blast-furnace plants, 30 percent to foundries, 10 percent to other industrial plants, and 16 percent for residential heating.

TABLE 27.—Apparent consumption of coke in the United States, 1947–49 (average) and 1951–54, in net tons

Year	Total production	Imports	Exports	Net change in stocks	Apparent United States consumption [1]	Consumption			
						Iron furnaces [2]		All other purposes	
						Quantity	Percent	Quantity	Percent
1947–49 (average)	70,648,402	181,000	696,699	+280,230	69,852,473	55,877,463	80.0	13,975,010	20.0
1951	79,330,702	161,639	1,026,730	+372,258	78,093,353	66,623,205	85.3	11,470,148	14.7
1952	68,254,109	312,519	792,072	+418,685	67,355,871	57,969,044	86.1	9,386,827	13.9
1953	78,836,857	157,318	520,252	+778,051	77,695,872	69,596,514	89.6	8,099,358	10.4
1954	59,662,496	115,781	384,377	+269,132	59,124,768	51,741,260	87.5	7,383,508	12.5

[1] Production plus imports minus exports, plus or minus net change in stocks.

[2] American Iron and Steel Institute; figures include coke consumed in manufacture of ferroalloys.

TABLE 28.—Coke and coking coal consumed per net ton of pig iron produced in the United States, 1913, 1918, 1929, 1939, 1947–49 (average), and 1953–54

Year	Coke per net ton of pig iron and ferroalloys [1] (pounds)	Yield of coke from coal (percent)	Coking coal per net ton of pig iron and ferroalloys (pounds calculated)
1913	2,172.6	66.9	3,247.5
1918	2,120.7	66.4	3,193.8
1929	1,838.0	69.0	2,663.8
1939	1,778.0	69.8	2,547.3
1947–49 (av.)	1,919.7	69.7	2,754.2
1953	1,834.9	69.7	2,632.6
1954	1,763.3	69.7	2,529.8

[1] American Iron and Steel Institute; consumption per ton of pig iron only, excluding furnaces making ferroalloys, was 2,172.6 pounds in 1913, 2,120.7 in 1918, 1,813.3 in 1929, 1.760.0 in 1939, 1,892.8 in 1947–49 (average), 1,812.6 in 1953, and 1,745.7 in 1954.

TABLE 29.—Oven coke produced, used by producers, and sold in the United States in 1954, by States

State	Produced		Used by producing companies—				Commercial sales	
			In blast furnaces		For other purposes [1]		To blast-furnace plants	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Alabama	5,301,550	$88,993,489	4,315,159	$69,849,394	19,719	$352,152	7,773	(2)
California	627,577	(2)	623,323	(2)	316	(2)	-----	-----
Colorado	662,282	(2)	601,460	(2)	6,446	(2)	-----	-----
Illinois	2,248,206	38,969,746	1,890,262	32,313,411	69,736	1,261,393	124,374	$2,111,107
Indiana	8,200,262	144,961,650	7,622,124	133,960,945	10,086	152,291	9,321	(2)
Maryland	3,078,371	(2)	3,077,790	(2)	6,655	(2)	-----	-----
Massachusetts	516,344	(2)	124,666	(2)	66,317	(2)	-----	-----
Michigan	2,308,924	41,287,925	1,652,992	(2)	265,497	5,335,110	28,153	(2)
Minnesota	803,860	17,952,483	612,307	(2)	8,519	143,043	-----	-----
New Jersey	929,768	(2)	-----	-----	209,605	(2)	3,990	(2)
New York	3,578,703	52,685,854	2,806,748	41,142,187	291,873	3,988,841	309,368	(2)
Ohio	8,228,873	126,685,567	7,358,104	111,671,280	151,224	2,813,028	(2)	(2)
Pennsylvania	15,566,002	232,195,163	14,574,994	217,211,329	193,410	2,712,165	399,451	5,525,208
Tennessee	154,194	(2)	99,098	(2)	21,870	(2)	-----	-----
Texas	699,536	(2)	659,151	(2)	10,240	(2)	-----	-----
Utah	997,749	(2)	957,726	(2)	7,475	(2)	-----	-----
West Virginia	3,708,905	43,609,417	3,080,872	39,327,132	693,841	5,077,390	3,423	(2)
Connecticut, Kentucky, Missouri, and Wisconsin	1,450,336	25,220,963	-----	-----	116,218	1,824,957	(2)	(2)
Undistributed	-----	128,206,816	-----	146,543,256	-----	4,976,000	711,707	14,455,795
Total 1954	59,061,442	940,769,073	50,056,776	792,018,934	2,149,047	28,636,370	1,597,560	22,092,110
At merchant plants	7,362,967	122,679,136	124,666	(2)	1,759,637	20,898,398	1,214,065	16,610,401
At furnace plants	51,698,475	818,089,937	49,932,110	(2)	389,410	7,737,972	383,495	5,481,709
Total 1953 [4]	73,593,528	1,080,304,156	59,571,269	843,389,163	2,311,236	28,587,433	5,331,887	87,288,552

State	Commercial sales—Continued							
	To foundries		To other industrial plants [5]		For residential heating		Total	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Net tons
Alabama	483,991	$10,721,080	141,704	$2,062,177	48,867	(2)	682,335	$13,481,078
California	-----	-----	962	(2)	-----	-----	962	(2)
Colorado	5,138	(2)	23,054	(2)	108	(2)	28,300	(2)
Illinois	117,522	(2)	48,598	572,625	26,375	(2)	316,869	5,898,544
Indiana	313,960	(2)	161,129	1,899,722	60,512	$720,177	544,922	10,185,712
Maryland	-----	-----	-----	-----	-----	-----	-----	-----
Massachusetts	75,458	(2)	35,760	(2)	258,772	(2)	369,990	(2)
Michigan	188,254	(2)	77,046	970,128	129,847	1,595,020	423,300	7,629,593
Minnesota	117,125	(2)	51,841	842,770	13,135	(2)	182,101	3,829,842
New Jersey	68,061	(2)	192,328	(2)	379,795	(2)	644,174	(2)
New York	(2)	(2)	89,719	1,021,784	(2)	(2)	475,926	7,590,723
Ohio	216,250	5,140,874	89,874	985,837	(2)	(2)	584,227	9,903,767
Pennsylvania	183,999	4,221,620	199,639	2,087,418	103,613	1,579,970	886,702	13,414,216
Tennessee	28,937	(2)	2,953	(2)	-----	-----	31,890	(2)
Texas	1,311	(2)	18,788	(2)	-----	-----	20,099	(2)
Utah	-----	-----	46,599	(2)	2,484	(2)	49,083	(2)
West Virginia	-----	-----	52,244	377,353	124	(2)	55,791	425,994
Connecticut, Kentucky, Missouri, and Wisconsin	(2)	10,967,696	79,743	1,145,420	162,802	(2)	1,172,484	20,123,105
Undistributed	496,194	22,691,238	-----	4,690,538	76,980	14,846,952	-----	18,749,935
Total 1954	2,296,200	53,742,508	1,311,981	16,655,772	1,263,414	18,742,119	6,469,155	111,232,509
At merchant plants	2,091,507	49,078,497	715,065	10,379,687	1,127,900	17,214,576	5,148,537	93,283,161
At furnace plants	204,693	4,664,011	596,916	6,276,085	135,514	1,527,543	1,320,618	17,949,348
Total 1953 [4]	2,795,312	66,733,989	1,518,821	20,843,937	1,459,420	22,257,637	11,105,440	197,124,115

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[1] Comprises 240,107 tons valued at $5,386,011 used in foundries; 342,148 tons, $4,962,302 to make producer gas; 1,028,646 tons, $9,975,528 to make water gas; and 538,146 tons, $8,312,529 for other purposes.

[2] Included with "Undistributed" to avoid disclosure of individual company figures.

[3] Concealed to avoid disclosure of individual company figures.

[4] Sales to financially affiliated companies (formerly included under "sold") are now included with coke used by producing companies, and 1953 figures are revised accordingly.

[5] Includes 63,145 tons valued at $1,061,369 sold to water-gas plants.

TABLE 30.—Beehive coke produced, used by producers, and sold in the United States in 1954, by States

State	Produced		Used by producing companies				Commercial sales	
			In blast furnaces		For other purposes		To blast-furnace plants	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Kentucky							1,197	(1)
Pennsylvania	432,061	$5,884,403	204,878	$3,172,449	121	$1,646	84,617	$1,201,268
Utah	58,558	(1)						
Virginia	72,092	1,032,462					27,051	(1)
West Virginia	38,343	(1)					1,322	(1)
Undistributed		1,594,623						440,632
Total: 1954	601,054	8,511,488	204,878	3,172,449	121	1,646	114,187	1,641,900
1953 [2]	5,243,329	76,257,848	2,007,821	28,467,261	87	1,266	2,817,523	41,362,646

State	Commercial sales—Continued							
	To foundries		To other industrial plants [3]		For residential heating		Total	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Kentucky	632	(1)					1,829	(1)
Pennsylvania	14,732	(1)	127,613	$1,281,004	1,755	(1)	228,717	$2,724,181
Utah			58,397	(1)			58,397	(1)
Virginia	3,569	$53,568	40,311	557,182	1,553	(1)	72,484	1,038,202
West Virginia	13,321	(1)	24,769	(1)			39,412	(1)
Undistributed		441,442		1,377,854		$42,311		1,632,878
Total: 1954	32,254	495,010	251,090	3,216,040	3,308	42,311	400,839	5,395,261
1953 [2]	67,706	1,059,237	354,369	5,402,991	8,542	116,275	3,248,140	47,941,149

[1] Included with "Undistributed" to avoid disclosure of individual company figures.

[2] Sales to financially affiliated companies (formerly included under "sold") are now included with coke used by producing companies, and 1953 figures are revised accordingly.

[3] Includes 57 tons valued at $721 sold to water-gas plants.

DISTRIBUTION OF OVEN AND BEEHIVE COKE

Distribution of coke and breeze shipments from producing plants in 1954, by principal end uses, and final destinations is summarized in table 31. The widespread geographic distribution of coke evidences its numerous industrial applications. The iron and steel industry is the leading consumer of coke and breeze, most of which is used for smelting iron ore in blast furnaces. Therefore, States that have blast-furnace installations were the leading consumers of coke in 1954 and were as follows: Pennsylvania, Ohio, Indiana, Alabama, and Illinois. Other States that ranked high in overall coke consumption were New York, Maryland, Michigan, and West Virginia, all of which consumed over 2 million tons. For discussion purposes, the terms "distribution" and "consumption" are synonymous in this section.

There were 18 States where coke was charged into blast furnaces; of these, Pennsylvania consumed 27 percent of the total deliveries to blast-furnace plants in the United States, Ohio 19 percent, and Indiana 12 percent. These three States thus consumed more blast-furnace coke than all 15 other States combined.

United States iron foundries are scattered widely, and foundry coke was shipped to every State, as well as the District of Columbia and a number of foreign countries, in 1954. Michigan, the center of the automobile industry and the largest producer of iron castings, led all States in foundry-coke consumption by a wide margin. The quantity of coke shipped to foundries in Michigan was equivalent to 23 percent of total shipments for this use in the United States. Ohio and Illinois followed Michigan with 10 and 9 percent, respectively, of foundry-coke shipments. Shipments of coke to producer- and water-gas

TABLE 31.—Distribution of oven and beehive coke and breeze in 1954, in net tons

[Based upon reports from producers showing destination and principal end use of coke used or sold. Does not include imported coke, which totaled 115,781 tons in 1954]

Consuming State	Coke							Breeze
	To blast-furnace plants	To foundries	To producer-gas plants	To water-gas plants	To other industrial plants	For residential heating	Total	
Alabama	4, 322, 932	191, 952	--------	--------	41, 555	19, 288	4, 575, 727	226, 881
Arizona	--------	4, 293	--------	--------	91	--------	4, 384	43
Arkansas	--------	5, 102	--------	--------	808	--------	5, 910	126
California	623, 323	57, 174	--------	--------	66, 128	--------	746, 625	48, 177
Colorado	601, 460	8, 785	--------	--------	23, 309	85	633, 639	48, 851
Connecticut	--------	38, 209	63, 405	6, 970	4, 670	88, 062	201, 316	39, 778
Delaware	--------	1, 672	--------	--------	1, 858	176	3, 706	--------
District of Columbia	--------	24	--------	--------	81	--------	105	--------
Florida	--------	1, 836	--------	20, 510	10, 505	661	33, 512	27, 320
Georgia	--------	10, 669	--------	--------	7, 473	6, 649	24, 791	1, 741
Idaho	--------	650	--------	--------	37, 431	76	38, 157	41, 974
Illinois	3, 918, 403	227, 900	--------	--------	46, 556	55, 070	4, 247, 929	221, 273
Indiana	6, 210, 942	134, 068	--------	4, 139	54, 695	46, 321	6, 450, 165	458, 680
Iowa	--------	46, 343	--------	--------	22, 042	2, 357	70, 742	6, 968
Kansas	--------	9, 614	--------	--------	888	23	10, 525	--------
Kentucky	488, 697	33, 139	--------	--------	102, 970	6, 822	631, 628	17, 223
Louisiana	--------	2, 532	--------	--------	58, 165	185	60, 882	590
Maine	--------	3, 276	--------	15, 118	250	11, 486	30, 130	--------
Maryland	3, 088, 755	18, 712	--------	--------	14, 888	44	3, 122, 399	261, 950
Massachusetts	124, 666	47, 960	59, 817	16, 834	9, 620	257, 547	516, 444	55, 748
Michigan	1, 770, 279	574, 061	--------	--------	169, 432	68, 155	2, 581, 927	156, 324
Minnesota	506, 035	23, 819	--------	6, 166	23, 959	10, 755	570, 734	57, 246
Mississippi	--------	1, 022	--------	--------	62	--------	1, 084	318
Missouri	--------	72, 040	--------	--------	6, 915	853	79, 808	2, 219
Montana	--------	746	--------	--------	17, 621	25	18, 392	24, 600
Nebraska	--------	5, 003	--------	--------	6, 446	154	11, 603	--------
Nevada	--------	55	--------	--------	24, 155	--------	24, 210	1, 841
New Hampshire	--------	2, 658	--------	75	57	11, 258	14, 048	41
New Jersey	--------	79, 638	79, 606	115, 179	91, 021	241, 204	606, 648	74, 471
New Mexico	--------	1, 235	--------	--------	227	--------	1, 462	1, 134
New York	3, 126, 986	95, 094	36, 106	128, 945	215, 498	178, 841	3, 781, 470	380, 522
North Carolina	--------	12, 583	--------	1. 442	16, 320	1, 556	31, 901	11, 423
North Dakota	--------	347	--------	--------	143	488	978	--------
Ohio	9, 677, 443	257, 637	--------	44, 813	170, 442	82, 214	10, 232, 549	515, 840
Oklahoma	--------	4, 752	--------	--------	2, 302	--------	7, 054	16, 448
Oregon	--------	5, 855	--------	--------	14, 686	--------	20, 541	580
Pennsylvania	14, 113, 318	170, 726	103, 093	15, 604	346, 216	101, 548	14, 850, 505	1, 063, 035
Rhode Island	--------	9, 282	--------	--------	169	7, 715	17, 166	--------
South Carolina	--------	4, 176	--------	111	12, 328	1, 023	17, 638	643
South Dakota	--------	328	--------	--------	485	109	922	--------
Tennessee	99, 098	77, 390	--------	--------	73, 761	7, 231	257, 480	176, 090
Texas	659, 151	50, 083	--------	--------	55, 258	--------	764, 492	89, 990
Utah	957, 726	10, 139	--------	--------	28, 322	2, 383	998, 570	85, 006
Vermont	--------	4, 110	--------	--------	137	2, 802	7, 049	--------
Virginia	68, 769	41, 790	--------	22, 686	49, 377	1, 413	184, 035	8, 336
Washington	--------	4, 727	--------	--------	4, 338	--------	9, 065	4, 344
West Virginia	1, 603, 070	4, 550	--------	692, 691	14, 455	2, 076	2, 316, 842	215, 392
Wisconsin	--------	121, 551	121	--------	9, 139	31, 692	162, 503	33, 960
Wyoming	--------	14	--------	--------	2, 876	--------	2. 890	5
Total	51, 961, 053	2, 479, 321	342, 148	1, 091, 283	1, 860, 130	1, 248, 347	58, 982, 282	4, 377, 131
Exported	12, 348	89, 240	--------	565	178, 006	18, 375	298, 534	12, 594
Grand total	51, 973, 401	2, 568, 561	342, 148	1, 091, 848	2, 038, 136	1, 266, 722	59, 280, 816	4, 389, 725

plants continued to decline. West Virginia, which produced chemicals from the synthesis gas made from coke led all States in coke consumed in water-gas generators. Coke for other industrial uses was reported to have been shipped to every State; and Pennsylvania, New York, Ohio, and Michigan combined consumed 48 percent of the total. Use of coke for residential heating continued to decline in 1954. Coke for this purpose is seldom shipped as widely or as far as that used for industrial purposes, and most shipments are consumed near the producing plants. The total amount used for residential heating in the United States in 1954 was smaller than that consumed in New York alone in 1945.

STOCKS OF COKE AND COKING COAL

Coke.—Stocks of coke and breeze shown in tables 32 and 33 represent reserves of material at producing plants and do not include coke or breeze stocked by some producers at affiliated steel plants. Although coke does not deteriorate appreciably when stocked, producers like to keep their stocks at a minimum because some degradation occurs in storing and reclaiming it. Stocks of all grades of coke increased in various amounts, whereas stocks of breeze dropped. Foundry coke at oven-coke plants more than tripled, while coke for "residential heating and other" and blast-furnace uses increased 16 and 4 percent, respectively. Table 33 shows that in 1954 stocks decreased only slightly (1,974 tons) at furnace plants but increased 277,059 tons at merchant plants. Stocks at furnace plants were equivalent to 10 days' production at the rate prevailing in December 1954, whereas merchant stocks equaled 59 days' production. Nearly all of the coke held by the furnace oven-coke plants was blast-furnace grade. Merchant-plant stocks consisted of 40 percent blast furnace, 10 percent foundry, and 50 percent all other grades. Beehive coke is rarely stocked by the producing company, which explains the small tonnage shown in table 32.

Coal.—The maintenance of adequate stocks of bituminous coal is essential to oven-coke plant operators because of the continuous nature of the carbonization process. Usually a 30-day supply is the minimum desired by most operators as a safeguard against disruption in the flow of coal to the ovens. However, coke plants on the Upper Lakes, which are supplied principally by boat, build up inventories during the shipping season for an adequate tonnage for the winter. These plants usually have stocked 4 to 5 months' supply at the end of the lake shipping season.

Stocks of bituminous coal decreased 25 percent during the year, and reserves on December 31, 1954, were the lowest in 5 years. In spite of the decline, stocks were still fairly high, and the 12.4 million tons stockpiled was adequate for 48 days' requirements at the consuming rate in December. Stocks of anthracite also declined; but the practice of using anthracite in the coking-coal admixture is not universal, and only 18 of the 82 active oven-coke plants reported anthracite stocks.

TABLE 32.—Producers' stocks of coke and breeze in the United States on Dec. 31, 1954, by States, in net tons

State	Coke				Breeze
	Blast furnace	Foundry	Residential heating and other	Total	
Oven coke:					
Alabama	376, 719	20, 968	20, 762	418, 449	23, 252
California	6, 715	---------	---------	6, 715	---------
Colorado	29, 897	---------	---------	29, 897	5, 674
Illinois	118, 219	---------	741	118, 960	36, 772
Indiana	241, 823	1, 021	18, 806	261, 650	250, 115
Maryland	71, 679	---------	---------	71, 679	24, 291
Massachusetts	154, 260	540	60, 847	215, 647	---------
Michigan	15, 325	1, 409	10, 845	27, 579	6, 547
Minnesota	30, 435	2, 438	13, 060	45, 933	20, 733
New Jersey	116, 809	586	107, 459	224, 854	21, 953
New York	141, 011	---------	148, 576	289, 587	76, 537
Ohio	210, 291	31, 541	33, 673	275, 505	45, 274
Pennsylvania	321, 857	974	136, 300	459, 131	110, 872
Tennessee	11, 860	2, 618	3, 325	17, 803	1, 460
Texas	10, 390	1, 564	---------	11, 954	241
Utah	104, 517	---------	---------	104, 517	3, 355
West Virginia	18, 073	---------	4, 709	22, 782	10, 814
Connecticut, Kentucky, Missouri, and Wisconsin	83, 588	76, 897	178, 444	338, 929	25, 755
Total	2, 063, 468	140, 556	737, 547	2, 941, 571	663, 645
At merchant plants	522, 855	133, 668	660, 809	1, 317, 332	95, 296
At furnace plants	1, 540, 613	6, 888	76, 738	1, 624, 239	568, 349
Beehive coke:					
Pennsylvania	1, 545	---------	3, 538	5, 083	37
Utah	---------	---------	349	349	---------
Virginia	466	39	428	933	403
West Virginia	---------	769	135	904	---------
Total	2, 011	808	4, 450	7, 269	440

TABLE 33.—Producers' month-end stocks of oven coke in the United States, 1953–54, in net tons

[Includes blast-furnace, foundry, and domestic coke]

Month	Furnace plants		Merchant plants		Total	
	1953	1954	1953	1954	1953	1954
January	1, 672, 422	1, 702, 096	402, 280	1, 048, 913	2, 074, 702	2, 751, 009
February	1, 641, 343	1, 648, 676	353, 660	1, 095, 701	1, 995, 003	2, 744, 377
March	1, 581, 167	1, 525, 059	391, 719	1, 193, 797	1, 972, 886	2, 718, 856
April	1, 541, 336	1, 579, 319	467, 251	1, 280, 870	2, 008, 587	2, 860, 189
May	1, 665, 740	1, 657, 007	529, 001	1, 354, 989	2, 134, 741	3, 011, 996
June	1, 572, 492	1, 608, 801	556, 976	1, 364, 236	2, 129, 468	2, 973, 037
July	1, 528, 749	1, 619, 475	691, 943	1, 223, 564	2, 220, 692	2, 843, 039
August	1, 598, 150	1, 624, 393	777, 547	1, 231, 481	2, 375, 697	2, 855, 874
September	1, 624, 340	1, 693, 152	850, 203	1, 223, 635	2, 474, 543	2, 916, 787
October	1, 630, 009	1, 638, 135	883, 342	1, 212, 560	2, 513, 351	2, 850, 695
November	1, 698, 241	1, 597, 262	959, 488	1, 206, 854	2, 657, 729	2, 804, 116
December	1, 626, 213	1, 624, 239	1, 040, 273	1, 317, 332	2, 666, 486	2, 941, 571

TABLE 34.—Month-end stocks of bituminous coal at oven-coke plants in the United States, 1950–54, in net tons

Month	1950	1951	1952	1953	1954
January	7, 087, 355	16, 960, 185	14, 827, 371	13, 400, 118	14, 885, 244
February	3, 448, 610	16, 366, 139	15, 786, 416	13, 381, 865	14, 729, 885
March	4, 847, 923	16, 751, 447	16, 726, 606	13, 278, 027	13, 886, 998
April	7, 490, 871	16, 464, 045	16, 652, 421	13, 408, 394	12, 856, 055
May	9, 572, 167	16, 179, 877	16, 799, 063	13, 898, 342	12, 595, 826
June	11, 279, 551	16, 254, 127	16, 894, 290	14, 537, 894	12, 659, 445
July	10, 385, 780	14, 034, 705	16, 135, 572	13, 220, 760	11, 125, 064
August	12, 339, 744	14, 448, 916	16, 066, 471	14, 698, 394	11, 571, 296
September	13, 964, 334	14, 426, 401	15, 728, 472	15, 910, 098	11, 869, 082
October	15, 665, 689	14, 953, 056	14, 436, 545	16, 609, 099	12, 192, 655
November	16, 329, 150	15, 123, 117	13, 637, 219	16, 719, 776	12, 484, 403
December	16, 776, 070	15, 257, 762	14, 429, 783	16, 485, 527	12, 356, 618

TABLE 35.—Month-end stocks of anthracite at oven-coke plants in the United States, 1950–54, in net tons

Month	1950	1951	1952	1953	1954
January	68, 715	31, 618	46, 933	44, 803	72, 594
February	60, 899	26, 094	38, 495	35, 389	63, 369
March	49, 900	22, 634	34, 719	32, 513	54, 288
April	41, 873	24, 406	30, 506	33, 480	48, 211
May	67, 687	32, 971	29, 399	44, 524	37, 244
June	29, 710	44, 193	42, 216	58, 561	45, 822
July	28, 703	44, 036	41, 583	57, 989	44, 525
August	28, 671	46, 191	45, 300	60, 010	47, 788
September	29, 388	39, 280	43, 865	61, 559	44, 858
October	34, 260	51, 656	50, 148	70, 066	50, 736
November	35, 710	58, 903	58, 422	74, 386	56, 856
December	33, 496	57, 122	54, 720	79, 381	54, 130

ASSIGNED VALUE AND PRICE

The average values, at the ovens, of oven and beehive coke produced, which include coke consumed by producing companies as well as coke sold, are based on reports from the producing companies showing receipts f. o. b. plant for coke that is sold and market values assigned by producers for coke that is consumed by the producing companies. The assigned value per ton of the total coke produced and the average price f. o. b. for coke sold are shown in tables 36 and 37. The average monthly prices of furnace and foundry beehive coke and foundry oven coke in certain markets, quoted by Steel Magazine in 1954, are shown in table 38.

Before 1954 the producing companies were requested to assign only a bookkeeping value to the coke consumed by the producing companies. In 1954 the producers were requested to assign a market value at the plant to the portion of their production that they used. As a consequence, the average value of coke produced at oven coke plants shows an increase over previous years. Average prices of coke, based on commercial sales, were substantially below those reported in 1953.

For the first time the reported average price per ton of coke sold to blast-furnace plants was less for oven than for beehive coke (table 37). On the other hand, the price of oven coke sold to foundries was much greater than for beehive coke. Prices of coke sold for other industrial purposes by both oven and beehive producers were comparable, whereas the oven coke sold for residential heating was several dollars per ton higher than beehive. However, the quantity of beehive coke sold for residential heating was small.

TABLE 36.—Average value per net ton of coke produced and average receipts per net ton from coke sold (commercial sales) in the United States, 1947–49 (average) and 1951–54

Year	Value per ton produced			Receipts per ton sold		
	Oven coke	Beehive coke	Total	Oven coke	Beehive coke	Total
1947–49 (average)	$12.08	$11.32	$12.02	$13.87	$11.95	$13.41
1951	14.13	13.95	14.11	17.04	14.33	16.25
1952	14.49	13.92	14.45	17.26	14.43	16.72
1953	14.68	14.54	14.67	17.75	14.76	17.07
1954	15.93	14.16	15.91	17.19	13.46	16.98

TABLE 37.—Average receipts per net ton of coke sold (commercial sales) in the United States in 1954, by States

State	Oven coke				Beehive coke			
	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating
Alabama	(2)	$22.15	$14.55	$11.52	--------	--------	--------	--------
California, Colorado, Texas, and Utah	--------	23.11	16.38	13.48	--------	--------	(2)	--------
Connecticut, Massachusetts, New Jersey, and New York	$16.34	23.41	13.30	15.67	--------	--------	--------	--------
Illinois	16.97	(2)	11.78	14.95	--------	--------	--------	--------
Indiana	(2)	(2)	11.79	11.90	--------	--------	--------	--------
Kentucky, Missouri, and Tennessee	11.15	23.65	13.71	(2)	(2)	(2)	--------	--------
Michigan, Minnesota, and Wisconsin	(2)	24.32	14.24	13.40	--------	--------	--------	--------
Ohio	(2)	23.77	10.97	11.77	--------	--------	--------	--------
Pennsylvania	13.83	22.94	10.46	15.25	$14.20	$15.02	$10.04	$11.75
Virginia	--------	--------	--------	--------	(2)	15.01	13.82	13.97
West Virginia	(2)	--------	7.22	(2)	(2)	(2)	(2)	--------
Undistributed	14.15	23.65	--------	12.30	14.90	15.78	16.57	--------
United States average, 1954	13.83	23.40	12.70	14.83	14.38	15.35	12.81	12.79
At merchant plants	13.68	23.47	14.52	15.26	--------	--------	--------	--------
At furnace plants	14.29	22.79	10.51	11.27	--------	--------	--------	--------
United States average, 1953	16.37	23.87	13.72	15.25	14.68	15.64	15.25	13.61

[1] Includes coke sold to water-gas plants.
[2] Included with "Undistributed" to avoid disclosure of individual company figures.

TABLE 38.—Average monthly prices per net ton of furnace and foundry beehive coke and foundry oven coke in the United States in 1954 [1]

	January	February	March	April	May	June	July	August	September	October	November	December
Beehive coke, at ovens:												
Connellsville furnace	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.75	$14.00	$13.75	$13.75
Connellsville foundry	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75	16.75
Oven foundry coke, at ovens:												
Birmingham	22.65	22.65	22.65	22.65	22.65	22.65	22.65	22.65	22.65	22.65	22.65	22.65
Chicago	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50
Detroit	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50
Erie	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Everett [2]	26.00	26.00	26.00	26.00	26.05	26.05	26.05	26.05	26.05	26.05	26.05	26.05
Indianapolis	24.25	24.25	24.25	24.25	24.25	24.25	24.25	24.25	24.25	24.25	24.25	24.25
Kearny	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
Lone Star	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50	18.50
Milwaukee	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25	25.25
Painesville	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50
Philadelphia	23.95	23.95	23.95	23.71	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Portsmouth	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
St. Louis [3]	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
St. Paul	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75
Swedeland	23.85	23.85	23.85	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Terre Haute	24.05	24.05	24.05	24.05	24.05	24.05	24.05	24.05	24.05	24.05	24.05	24.05

[1] Average of weekly quotations by Steel Magazine.
[2] New England delivered or within $4.55 freight zone from works.
[3] Delivered.

FOREIGN TRADE [1]

Imports.—Imports of coke are not of great importance to the United States except to certain local areas. The quantity imported in 1954 declined 26 percent to 115,781 net tons and was less than 1 day's production in the United States. Nearly all of the coke was imported from Canada; however, 1,102 tons came from West Germany and 44 tons from the United Kingdom. Most of the Canadian coke entered the United States through the Montana-Idaho customs district. This district received the largest tonnage on record, which indicated that requirements of carbonaceous fuel in the Northwest and the western section of the United States were increasing. Although the Bureau does not collect precise data on the uses of imported coke in these sections, it can safely be assumed that most of it was used in smelting nonferrous metals. Imports through the Buffalo customs district were almost negligible, whereas in 1952 144,368 tons had entered the United States through this gateway.

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[1] Figures on imports and exports compiled by Mae B. Price and Elsie D. Page, of the Bureau of Mines, from records of the U. S. Department of Commerce.

Exports.—Normally exports of coke are not large, except for shipments to Canada. Shortages of coke in many European countries in the postwar years resulted in larger exports to these countries. Shipments to Europe in 1951 were larger than shipments to Canada in 1954, and exports to South American countries for the three years preceding 1954 averaged around 30,000 tons annually. However, increased carbonizing capacity in Europe increased the supply of coke accordingly and lessened the need for American coke. In 1954 exports of coke to Europe were about one-third as large as in 1953, and about one-fifth as large as in 1952. The only European countries that imported coke from the United States in 1954 were Spain and Greece. Exports to South America dwindled to less than 1,000 tons. In previous years Argentina and Brazil were the two largest consumers of coke in South America. Argentina did not import any from the United States in 1954 but obtained nearly all of its supply from the United Kingdom, whereas Brazil imported most of its coke from West Germany. Exports to other countries were small, although a substantial tonnage of coke was shipped to Oceania, French Pacific Islands.

TABLE 39.—Coke imported for consumption in the United States, 1952–54, by countries and customs districts

[U. S. Department of Commerce]

	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
Canada	308,803	$4,462,891	157,318	$1,714,540	114,635	$1,229,671
Netherlands Antilles	9	375				
Total	308,812	4,463,266	157,318	1,714,540	114,635	1,229,671
Europe:						
France			(1)	2		
Germany, West					1,102	26,911
Netherlands	3,696	62,862				
United Kingdom	11	465			44	1,872
Total	3,707	63,327	(1)	2	1,146	28,783
Grand total	312,519	4,526,593	157,318	1,714,542	115,781	[2] 1,258,454
CUSTOMS DISTRICT						
Buffalo	144,368	2,707,502	15,796	255,557	720	5,780
Dakota	17,044	87,522	12,279	57,040	4,045	49,272
Maine and New Hampshire	259	3,444	250	4,207	237	3,612
Michigan	47,044	531,786	47,093	464,254	12,000	103,417
Montana and Idaho	80,057	874,210	67,397	835,417	95,148	1,044,029
New York	11	465	(1)	2	44	1,872
Puerto Rico	3,696	62,862			1,102	26,911
St. Lawrence	13,918	231,372	2,790	43,495		
San Francisco	9	375				
Vermont	87	1,770	357	5,791	758	14,362
Washington	6,026	25,285	11,356	48,779	1,727	9,199
Total	312,519	4,526,593	157,318	1,714,542	115,781	[2] 1,258,454

[1] Less than 1 ton.

[2] Due to changes in tabulating procedures by the U. S. Department of Commerce, data known not to be strictly comparable to those for earlier years

TABLE 40.—Coke exported from the United States, 1952–54, by countries and customs districts

[U. S. Department of Commerce]

	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
Canada	533, 832	$8, 497, 230	369, 745	$6, 500, 463	264, 019	$4, 574, 437
Mexico	21, 592	482, 543	8, 044	154, 137	18, 746	284, 724
Panama	93	3, 503	56	2, 770	85	6, 057
West Indies:						
Cuba	15, 743	272, 642	18, 644	342, 719	23, 246	348, 854
Trinidad and Tobago	220	5, 762	---------	---------	---------	---------
Other North America	924	37, 015	877	34, 147	187	6, 243
Total	572, 404	9, 298, 695	397, 366	7, 034, 236	306, 283	5, 220, 815
South America:						
Argentina	5, 583	117, 107	15, 946	391, 435	---------	---------
Bolivia	616	26, 712	187	7, 254	236	8, 671
Brazil	22, 389	755, 670	12, 097	271, 502	21	1, 992
Chile	1, 019	21, 711	389	8, 483	175	6, 063
Ecuador	269	10, 847	28	1, 014	120	9, 252
Peru	855	23, 757	36	1, 377	---------	---------
Uruguay	104	4, 556	---------	---------	205	5, 006
Venezuela	481	23, 154	233	9, 300	126	6, 008
Other South America	71	3, 035	20	827	24	2, 315
Total	31, 387	986, 549	28, 936	691, 192	907	39, 307
Europe:						
Finland	22, 652	468, 619	---------	---------	---------	---------
France	4, 800	115, 703	---------	---------	---------	---------
Germany, West	2, 616	32, 901	---------	---------	---------	---------
Greece	---------	---------	---------	---------	2, 246	35, 937
Norway	35, 732	550, 638	---------	---------	---------	---------
Spain	54, 868	925, 433	92, 008	1, 473, 108	35, 071	455, 134
Yugoslavia	62, 762	1, 228, 820	---------	---------	---------	---------
Other Europe	34	1, 077	---------	---------	---------	---------
Total	183, 464	3, 323, 191	92, 008	1, 473, 108	37, 317	491, 071
Asia:						
Lebanon	18	1, 925	---------	---------	---------	---------
Philippines	1, 608	52, 684	1, 942	70, 366	200	2, 316
Other Asia	152	6, 650	---------	---------	---------	---------
Total	1, 778	61, 259	1, 942	70, 366	200	2, 316
Africa:						
Egypt	3, 005	57, 970	---------	---------	---------	---------
Other Africa	34	801	---------	---------	---------	---------
Total	3, 039	58, 771	---------	---------	---------	---------
Oceania: French Pacific Islands	---------	---------	---------	---------	39, 670	494, 837
Grand total	792, 072	13, 728, 465	520, 252	9, 268, 902	384, 377	6, 247, 846
CUSTOMS DISTRICT						
Buffalo	224, 566	3, 591, 567	128, 743	2, 335, 216	83, 976	1, 551, 539
Dakota	12, 862	269, 928	12, 709	291, 355	12, 496	298, 938
Duluth and Superior	6, 148	120. 289	4, 845	104, 986	4, 523	102, 982
El Paso	300	1, 802	57	1, 404	28	674
Florida	1, 849	52, 417	1, 717	52, 236	1, 910	60, 755
Laredo	20, 019	447, 977	6, 791	126, 759	7, 391	137, 133
Los Angeles	---------	---------	480	3, 345	2, 466	17, 263
Maryland	28, 367	641, 877	4, 244	88, 440	9	945
Michigan	252, 523	4, 209, 477	193, 835	3, 550, 450	130, 590	2, 336, 721
Mobile	1, 033	24, 386	1, 384	34, 760	2, 031	50, 769
Montana and Idaho	36	852	---------	---------	---------	---------
New Orleans	6, 343	242, 325	3, 758	118, 052	1, 044	47, 018
New York	101, 340	1, 781, 801	105, 502	1, 731, 609	11, 586	182, 738
Ohio	30, 878	200, 631	9, 530	47, 346	17, 317	91, 096
Philadelphia	87, 095	1, 749, 279	22, 259	527, 242	63, 988	792, 043
Rhode Island	---------	---------	3, 500	57, 750	21, 029	256, 211
St. Lawrence	5, 397	69, 801	17, 082	102, 481	1, 230	14, 375
San Diego	717	14, 093	231	5, 889	848	25, 559

TABLE 40.—Coke exported from the United States, 1952–54, by countries and customs districts—Continued

[U. S. Department of Commerce]

	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
CUSTOMS DISTRICT—continued						
San Francisco	----------	----------	44	2,310	----------	----------
South Carolina	4,800	115,703	----------	----------	----------	----------
Virginia	5,960	146,227	82	2,280	205	5,006
Washington	1,422	34,685	1,844	55,083	1,387	35,276
Other districts	417	13,348	1,615	29,909	20,323	240,805
Total	792,072	13,728,465	520,252	9,268,902	384,377	6,247,846

TECHNOLOGY

Extensive studies and a large amount of research were devoted to the conversion of coal into coke and coal chemicals in 1954. The Bureau of Mines continued its studies on the carbonizing properties, plasticity, expansion, bulk density, and washing characteristics of coal.[2] Forty-two coals from 28 beds in the Appalachian region were carbonized singly in the Bureau of Mines–American Gas Association (BM–AGA) retort. Studies were also continued on the mechanism and kinetics of coal carbonization to provide fundamental data and develop new techniques for assessing the factors that control the coking of coal. Results of research and investigative work on the effect of carbonizing temperature, bulk density, and composition of the coal blends on the yield and quality of products were summarized and published.[3] Standardized operating and testing procedures were developed for use in the Tuscaloosa experimental coke oven.[4] Subsequent investigations utilizing these procedures contributed information on the effects of variations in bulk density on coking time.[5] Studies on coal expansion were continued during the year and the initial phases of a long-range program on the subject were completed.[6] An index of coals tested by the Bureau of Mines was prepared and published to list in one publication all of the coals on which investigations on carbonizing properties and yield of coke and coal chemicals have been made.[7]

A 30-ton-per-hour prototype commercial fluidized-bed carbonizer was operated at Rockdale, Tex., utilizing dried lignite to produce char for firing power boilers and tars and liquid products for tests to determine characteristics and possible uses.[8]

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[2] Carman, E. P. and Caldwell, D. L., Report of Research and Technologic Work on Coal and Related Investigations, 1954: Bureau of Mines Inf. Circ. (in prep.).

[3] Smith, F. W. and Reynolds, D. A., The Effect of Temperature, Charge Density, and Blending on Carbonization of Coal: Bureau of Mines Rept. of Investigations 5110, 1955, 24 pp.

[4] Gayle, J. B. and Gulledge, E. L., Carbonizing Procedures With New Experimental Coke Oven: Bureau of Mines Rept. of Investigations 5011, 1954, 12 pp.

[5] Gayle, J. B. and Gulledge, E. L., Effects of Variations in Bulk Density on Coking Time: Bureau of Mines Rept. of Investigations 5027, 1954, 9 pp.

[6] Gayle, J. B., Eddy, W. H., and Brooks, J. A., Studies of Coal Expansion; (1) Fundamental Relation between Measured Gas and Wall Pressure; (2) Factors Influencing Pushing Pressures for Slot-Type Ovens: Chemical Engineering and Manufactured Gas Production Conference, Operating Section, American Gas Association, Pittsburgh, Pa., CEP–54–r, 1954, 7 pp.

[7] Brown, R. L., Davis, J. D., Reynolds, D. G., and Smith, F. W., Carbonizing Properties of American Coals; Index of Coals Tested by the Bureau of Mines: Bureau of Mines Bull. 536, 1954, 17 pp.

[8] Parry, V. F., Low-Temperature Carbonization of Coal and Lignite for Industrial Uses: Bureau of Mines Rept. of Investigations 5123, 1955, 27 pp.

Bituminous Coal Research, Inc., prepared and published an excellent summary on world coal research in 1954.[9] This article described briefly some studies and research work on coal carbonization, gasification, and coal-chemical production by Federal and State agencies, universities, and individual companies. The British Coke Research Association published two pamphlets that contained extensive bibliographies, issued between January and December 1954, relating to carbonization and other subjects of interest to the coke industry.[10] A similar bibliography published from June 1953 to April 1954 on coal and oil-shale pyrolysis was issued in September 1954.[11] This review contained 160 references and covered studies and investigative work on high- and low-temperature carbonization of coals, raw materials, product and by-product characteristics and properties, coke-oven equipment and improvements, and coke analyzing and testing procedures.

One of the many new techologic developments reported in 1954 that created much interest was the production of synthetic ammonia, ethylene, etc., from coke-oven gas by means of low-temperature separation.[12] This method of making ammonia synthesis gas ($3H_2$: $1N_2$) has been in operation for many years in some European countries but has not been practiced in the United States. The only coke plant in the United States where coke-oven gas is processed for the removal of hydrogen is the Belle, W. Va., plant of the Du Pont Co. However, the hydrogen is used primarily for the hydrogenation of other products and only occasionally to supplement the hydrogen from its water-gas operation used for ammonia production. In 1954 two companies operating coke ovens announced plans to use coke-oven gas as a source of hydrogen for anhydrous ammonia production. The largest coke-producing company—The United States Steel Corp.—engaged an engineering firm in 1954 to make a study and to design a plant to cost between 18 and 20 million dollars. This company decided to build the first plant at its Geneva works in Utah and later build a similar plant at Gary, Ind.[13] The other company that was proceeding with plans to build a similar plant was the Ketona Chemical Co. This company is owned jointly by the Hercules Powder Co. and the Alabama Byproducts Corp., and the plant (at Ketona, Ala.) will use coke-oven gas made by the latter company.

The Colorado Fuel & Iron Corp., in technical collaboration with the Monsanto Chemical Co. and the Koppers Co., Inc., developed a process to make diammonium phosphate.[14] It was claimed that this was the first commercial production of diammonium phosphate based on coke-oven ammonia and electric-furnace phosphoric acid. The new fertilizer material contains about 74 percent utilizable plant nutrients compared with only 20.5 percent for ammonium sulfate. The new process closely resembles the standard sulfate recovery of ammonia from coke-oven gas, except that electric-furnace phosphoric acid is used as the absorbent. Several other coke plants were doing research work on the same problem and planning to begin commercial production.

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[9] Igoe, J. W. and Rose, H. J., World Coal Research in 1954: Min. Cong. Jour., vol. 47, No. 2, February 1955, pp. 92–98 and 114.

[10] British Coke Research Association (74 Grosvenor Street, London W. 1.), Coke Review: No. 5, January–June 1954, 63 pp.; No. 6, July–December 1954, 64 pp.

[11] Prien, Charles N., Pyrolysis of Coal and Shale: Ind. Eng. Chem., vol. 46, No. 9, September 1954, pp. 1881–1888.

[12] Chemical Week, Ammonia Operates From a New Base: Vol. 75, No. 23, December 4, 1954, pp. 50–54.

[13] Chemical and Engineering News, Chemical Spurt in Salt Lake City: Vol. 32, No. 47, Nov. 22, 1954, p. 4644.

[14] Chemical Week, Operation Sidetrack: Vol. 76, No. 6, February 5, 1955, pp. 50–52.

A new process for removing ammonia, hydrogen sulfide, and hydrogen cyanide from coke-oven gas using waste pickle liquor from steel plants was described.[15] It is claimed that the equipment required for the process is relatively simple, and the cost of the installation can be repaid in a few years through the recovery of the chemical components.

A pilot-scale experimental coke oven was built and placed in operation by the Eastern Gas & Fuel Associates at its research laboratory, Everett, Mass. This oven, designed after protoypes such as those in use by the Illinois Geological Survey, the Bureau of Mines, and steel companies, is claimed to contain many modifications that contribute to ease and convenience of operation.[16]

WORLD REVIEW[17]

World production of coke is shown in tables 41 and 42. Table 41 includes only coke made at high temperatures in conventional slot-type and beehive-coke ovens. Data on coke made from coal in all other types of carbonizing equipment, such as low-temperature carbonizers and coal-gas retorts, are summarized in table 42. In some countries coke made in slot-type and beehive-coke ovens is called hard coke, metallurgical coke, and other names. As this type of coke is generally used in industrial applications it is a fairly good barometer of the industrial activity of the producing and consuming countries. Unless otherwise specified, this discussion covers such coke only.

World production of coke declined slightly in 1954 from the record output of 1953, principally because of the decline in the United States. In 1954, as in prior years, the United States led all countries in coke production, but the proportion of the world total produced by the coke ovens in the United States dropped. The United States produced about 26 percent of the world total in 1954 compared with 36 percent in 1950. Although precise data on coke production in the U. S. S. R. are not available, Government estimates based on reports from various sources indicate that this country ranked second in 1954. Coke production in the U. S. S. R. has increased faster in the last 5 years than anywhere else in the world. Production in West Germany has also increased rapidly since the end of World War II. Although production there declined slightly from 1953, the rate of production was about the same as in the years preceding the outbreak of World War II. The Ruhr district in West Germany was again one of the greatest coke-producing centers in the world. Before World War II this district, which is slightly smaller than metropolitan Chicago, produced more coke than any other country of the world except the United States. Even in 1954, when nearly every other European country had expanded coke capacity, the production in the Ruhr exceeded that of every country except the U.S.S.R., and was 21 percent of the total European output.

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[15] The Iron Age, New Process Washes Coke-Oven Gas With Waste Pickle Liquor: Vol. 175, No. 12, March 24, 1955, pp. 91–93.

[16] The Iron Age, Pilot-Plant Coke Oven Gives Researchers New Tool of Advanced Design: Vol. 174, No. 23, Dec. 2, 1954, pp. 124–125.

[17] Figures on world production compiled by Pauline Roberts, of the Foreign Statistics Unit, Division of Foreign Activities, Bureau of Mines.

As shown in table 41, the countries of Europe produced more coke in 1954 than all other continental groups combined. The countries in

TABLE 41.—World production of oven and beehive coke (excluding breeze), 1950–54, by countries, in thousand net tons [1]

Country	1950	1951	1952	1953	1954
North America:					
Canada	3,477	3,401	3,593	3,809	3,082
Mexico	432	429	510	429	440
United States	72,718	79,331	68,254	78,837	59,662
Total	76,627	83,161	72,357	83,075	63,184
South America:					
Brazil	316	315	331	366	[2] 375
Chile	------	274	256	268	292
Colombia	[2] 2	[2] 2	[2] 2	[2] 2	6
Peru	------	------	[2] 6	[2] 6	[2] 6
Total [2]	320	590	595	640	680
Europe:					
Austria	1,088	1,194	1,356	1,342	1,486
Belgium	5,054	6,731	7,076	6,562	6,776
Bulgaria [2]	11	11	17	23	28
Czechoslovakia	5,375	5,595	6,151	[2] 6,518	[2] 6,600
France	7,755	8,906	10,159	9,514	10,153
Germany:					
East [2]	330	390	440	440	460
West	30,129	[3] 37,074	[3] 41,081	[3] 41,699	[3] 38,602
Italy	1,670	2,404	2,723	2,689	2,883
Netherlands	3,091	3,277	3,558	3,532	3,699
Poland	6,587	6,984	8,111	8,678	[2] 8,800
Rumania [2]	130	165	290	345	340
Saar	3,557	4,151	4,285	3,956	3,978
Spain	1,043	1,097	1,311	1,301	1,349
Sweden	79	------	73	111	123
U. S. S. R.[2]	30,000	33,000	37,000	42,000	46,000
United Kingdom	17,295	18,027	19,143	19,579	19,995
Yugoslavia	------	------	15	259	453
Total [2]	113,000	129,000	143,000	149,000	152,000
Asia:					
China [2]	1,100	1,400	1,700	2,400	3,300
India	2,481	2,406	2,289	2,252	2,643
Iran	[4] 3	6	8	4	[2] 4
Japan	2,989	4,259	4,405	5,258	4,841
Korea:					
Republic of	[5] 6	[5] 3	1	1	[5] 1
North [2]	550	300	300	350	400
Taiwan (Formosa)	50	126	142	132	154
Turkey	340	337	441	593	561
Total [2]	8,000	9,000	9,200	11,000	12,000
Africa:					
Southern Rhodesia	106	104	121	150	[2] 168
Union of South Africa	1,142	1,382	1,491	1,593	1,526
Total	1,248	1,486	1,612	1,743	[2] 1,700
Oceania:					
Australia [6]	1,325	1,698	1,833	2,081	2,295
New Caledonia [2]	90	90	90	80	80
New Zealand	7	7	8	7	[2] 8
Total [2]	1,420	1,795	1,930	2,170	2,385
World total (estimate)	201,000	225,000	229,000	248,000	232,000

[1] Includes revisions of data published previously.
[2] Estimate.
[3] Includes electrode coke.
[4] Year ended Mar. 20 of year following that stated.
[5] Includes gashouse coke.
[6] Year ended June 30 of year stated.

the Western Hemisphere including the United States, produced only 42 percent of the quantity produced in Europe.

TABLE 42.—World production of gashouse, low-, and medium-temperature coke (excluding breeze), 1950–54, by countries, in thousand net tons[1]

Country [2]	1950	1951	1952	1953	1954
North America:					
Canada	242	245	175	158	132
United States [3]	174	127	45	237	256
Total [4]	530	480	330	500	500
South America:					
Argentina [4]	55	55	55	55	55
Chile	134	131	125	121	[4] 130
Peru, medium-temperature	[4] 22	[4] 22	22	[4] 22	[4] 22
Uruguay	36	37	40	40	61
Total [4]	245	245	240	240	270
Europe:					
Austria	613	504	500	451	504
Belgium	31	25	23	22	20
Czechoslovakia: [4]					
Gashouse	665	695	760	810	815
Lignite	800	840	930	1,000	1,000
Denmark	400	450	460	414	459
Finland	75	84	127	131	[4] 130
France:					
Gashouse	1,588	1,733	1,642	1,450	1,235
Low-temperature	278	300	308	295	353
Germany:					
East: [4]					
Gashouse	1,550	1,550	1,900	2,100	2,300
Lignite	5,600	6,000	6,400	6,500	6,800
West:					
Gashouse	3,460	4,074	4,633	4,639	4,725
Lignite	733	762	774	798	764
Greece	[4] 30	34	33	34	[4] 35
Hungary [4]	125	130	130	130	130
Ireland (Eire)	193	197	197	195	214
Italy	1,176	1,204	1,227	1,187	1,136
Luxembourg	34	36	35	34	36
Netherlands	1,098	1,056	1,023	908	947
Norway [5]	67	67	72	69	[4] 68
Poland: [4]					
Gashouse	450	450	450	450	475
Low-temperature	100	100	105	105	110
Portugal	28	30	31	37	[4] 40
Saar:					
Gashouse	1	------	------	------	------
Low-temperature	56	96	104	91	100
Spain	220	238	245	250	270
Sweden	635	670	740	680	751
Switzerland	[5] 452	[5] 514	[5] 505	[5] 494	331
United Kingdom:					
Great Britain	13,221	13,803	14,036	13,781	13,783
Northern Ireland	184	194	191	191	220
Yugoslavia	35	33	28	26	25
Total [4]	36,100	38,100	39,800	39,500	40,000
Asia:					
Ceylon	15	17	[4] 17	[4] 17	[4] 13
India:					
Gashouse	85	84	99	110	[4] 110
Low-temperature	1,421	1,409	1,617	1,857	1,951
Japan:					
Gashouse	1,468	1,862	2,076	2,361	2,429
Low-temperature [4]	195	210	130	130	85
Korea, Republic of	[4] 7	[4] 3	1	1	[4] 3
Malaya	12	15	[4] 17	[4] 17	[4] 19
Taiwan (Formosa):					
Gashouse	[4] 1	[4] 1	[4] 1	4	6
Low-temperature	12	42	37	49	41
Turkey:					
Gashouse	62	66	66	69	122
Low-temperature	76	79	46	[4] 45	[4] 35
Total [4]	3,500	4,000	4,300	4,800	5,000

See footnotes at end of table.

TABLE 42.—World production of gashouse, low-, and medium-temperature coke (excluding breeze), 1950–54, by countries, in thousand net tons [1]—Continued

Country [2]	1950	1951	1952	1953	1954
Africa:					
Algeria	97	106	101	104	98
Canary Islands	1	(6)	(6)	(6)	(6)
Egypt	25	30	[4] 30	[4] 30	[4] 28
Tunisia	14	14	18	17	12
Union of South Africa	[4] 75	[4] 85	[4] 85	104	99
Total [4]	210	235	235	255	235
Oceania:					
Australia [7]	1,176	1,246	1,348	1,199	[4] 1,200
New Zealand	110	67	[4] 65	[4] 65	[4] 65
Total	1,286	1,313	[4] 1,415	[4] 1,265	[4] 1,265
World total (estimate)	42,000	44,000	46,000	46,500	47,000

[1] Gashouse coke, unless otherwise specified.
[2] Production data for China, Mexico, Rumania, and U. S. S. R. are not available; estimates for these countries included in total.
[3] Retort coke only.
[4] Estimate.
[5] Includes breeze.
[6] Less than 500 tons.
[7] Year ended June 30 of year stated.

COAL-CHEMICAL MATERIALS

GENERAL SUMMARY

Coal-chemical materials include a variety of products recovered from the gases and vapors evolved during the distillation of coal in slot-type coke ovens. The principal or basic chemical raw materials are ammonia, crude tar, crude light oil, and coke-oven gas. Coke-oven gas is not generally processed in the United States for the manufacture of chemicals, but research initiated in 1954 may make possible its extensive utilization in the future (see section on Technology). Ammonia, crude tar, and crude light oil, particularly the last two, are further processed and supply a substantial part of the coal chemicals used by American industry.

The phenomenal growth of the chemical industry in the past 2 decades has increased the requirements of chemical raw materials. Expanded markets have stimulated interest in the manufacture of coal chemicals, and coke-oven operators have installed new equipment and developed improved techniques for producing larger quantities and purer products to meet the exacting specifications for these chemicals.

Crude light oil and its derivatives were the principal revenue producers among the coal-chemical materials. Benzene—the most important of the derivatives—supplied 18 percent of the revenue obtained by coke-oven operators from the sales of all chemical materials, including coke-oven gas. Although the dollar value assigned to surplus gas (table 43) was larger, approximately two-thirds of the surplus gas was used by the producing companies as boiler fuel or in steel or allied plants. Commercial sales of coke-oven gas (distributed through city mains and sold for industrial use) contributed slightly more revenue than did the commercial sales of ammonia products. Sales of crude tar and its derivatives totaled over $50 million, most of which was supplied by the sale of crude tar itself. However, the pitch made and used by the producing companies has not been assigned a value, and pitch, which is generally used as a fuel in metallurgical furnaces, comprises a substantial part of the products obtained in processing tar. If this portion were assigned the same average unit value as that for the amount sold, the value of tar and derivatives would exceed the value contributed by the light-oil group.

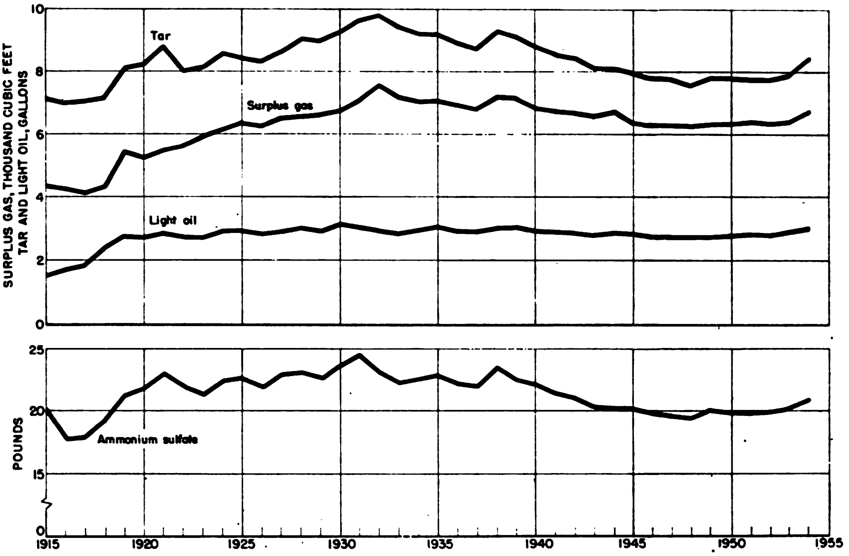

FIGURE 2.—Average yield of principal coal-chemical materials per net ton of coal carbonized in coke ovens, 1915–54. Yields of light oil and ammonium sulfate equivalent represent average for plants recovering these products.

The percentage of coal costs recovered by coal-chemical materials in 1954 increased over 1953 and equaled 38 percent of the value of coal carbonized. However, immediately before World War II the value of the coal-chemical materials used and sold was approximately 55 percent of the coal cost. Commercial sales of coke-oven gas then, however, represented about two-thirds of the value of the surplus gas and one-third of the value of all coal-chemical materials used and sold. Figure 3 illustrates the trend in values supplied by chemical materials, surplus gas, and coke and breeze. Detailed statistics on production and sales of coal-chemical materials are shown in table 43.

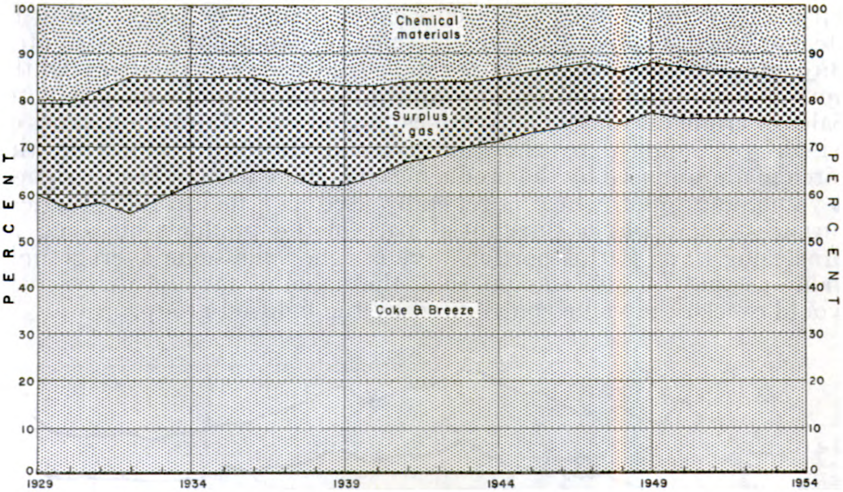

FIGURE 3.—Percentage of total value of coke-oven products from slot-type ovens supplied by coke and breeze, surplus gas, and chemical materials, 1929–54.

TABLE 43.—Coal-chemical materials produced at coke-oven installations in the United States in 1954 [1]

[Exclusive of breeze]

Product	Produced	Sold			On hand Dec. 31
		Quantity	Value		
			Total	Average	
Tar, crude .... gallons	715,840,473	[2] 355,878,669	$38,487,182	$0.108	30,823,791
Tar derivatives:					
Creosote oil:					
Distillate as such (straight creosote) .... do	19,587,965	18,959,350	3,609,856	.190	1,978,536
Creosote-coal tar solution .... do	6,881,563	6,688,549	1,281,758	.192	191,187
Crude chemical oil .... do	23,087,245	23,522,083	4,936,176	.210	1,054,528
Phenol .... pounds	8,740,568	6,689,928	851,893	.127	294,766
Pitch of tar:					
Soft [3] .... net tons	557,573	17,808	496,444	27.878	2,900
Medium [4] .... do	15,999	15,512	521,445	33.616	179
Hard [5] .... do	177,509	9,527	238,710	25.056	5,722
Other coal tar derivatives [6]	--------	--------	1,886,598	--------	--------
Ammonia:					
Sulfate .... pounds	1,645,636,400	1,638,967,393	34,644,877	.021	312,592,422
Liquor (NH₃ content) [7] .... do	32,207,066	19,596,259	1,066,242	.054	3,069,361
Total	--------	--------	35,711,119	--------	--------
Sulfate equivalent of all forms pounds	1,774,464,664	1,717,352,429	--------	--------	--------
NH₃ equivalent of all forms .... do	443,616,166	429,338,107	--------	--------	--------
Gas:					
Used under boilers, etc. .... M cubic feet	[8] 869,874,515	45,961,044	7,735,574	.168	--------
Used in steel or allied plants .... do		408,635,974	83,931,014	.205	--------
Distributed through city mains .... do		76,732,276	31,352,649	.409	--------
Sold for industrial use .... do		27,013,853	5,546,677	.205	--------
Total	869,874,515	558,343,147	128,565,914	.230	--------
Crude light oil .... gallons	[9] 246,018,627	14,647,521	3,495,456	.239	4,081,771

See footnotes at end of table.

TABLE 43.—Coal-chemical materials produced at coke-oven installations in the United States in 1954 [1]—Continued

[Exclusive of breeze]

Product	Produced	Sold			On hand Dec. 31
		Quantity	Value		
			Total	Average	
Light-oil derivatives:					
Benzene:					
Specification grades (1°, 2°, and 90%) ....gallons..	138, 260, 660	130, 906, 579	$50, 625, 864	$0. 387	10, 898, 036
Other industrial grades.......do....	1, 177, 126	950, 845	331, 847	. 349	82, 864
Motor grade..................do....	3, 327, 096	3, 254, 807	571, 678	. 176	86, 589
Toluene (all grades)..............do....	33, 383, 028	30, 547, 931	9, 663, 976	. 316	3, 033, 222
Xylene (all grades)...............do....	9, 956, 303	9, 527, 187	3, 120, 709	. 328	803, 253
Solvent naphtha (crude and refined) gallons..	4, 582, 782	4, 559, 895	1, 197, 206	. 263	323, 509
Other light-oil products..........do....	4, 072, 737	2, 705, 032	355, 718	. 132	220, 141
Total..................................	194, 759, 732	182, 452, 276	65, 866, 998	. 361	15, 447, 614
Intermediate light oil..............gallons..	2, 907, 059	2, 983, 978	496, 874	. 167	139, 493
Naphthalene (crude):					
Solidifying at less than 74° C..pounds..	22, 857, 876	24, 675, 886	642, 887	. 026	1, 802, 484
At 74° and less than 76° C.......do....	9, 235, 471	2, 580, 670	93, 397	. 036	418, 041
At 76° and less than 79° C.......do....	67, 965, 684	70, 045, 315	3, 632, 978	. 052	1, 017, 661
Pyridine:					
Crude bases (dry basis).......gallons..	232, 045	280, 515	393, 313	1. 403	159, 035
Refined (2° C.)................pounds..	580, 669	620, 671	545, 851	. 879	287, 667
Picolines........................do....	208, 545	190, 651	77, 071	. 404	49, 292
Sodium phenolate..................gallons..	3, 324, 777	2, 616, 773	306, 909	. 117	880, 109
Sulfur...........................pounds..	6, 694, 940	7, 786, 410	104, 926	. 013	503, 490
Value of all coal-chemical materials sold...	....	....	292, 243, 755	....	....

[1] Includes products of tar distillation conducted by coke-oven operators under same corporate name.
[2] Includes 28,059,083 gallons sold to affiliated companies for refining.
[3] Water-softening point, less than 110° F.
[4] Water-softening point, 110° to 160° F.
[5] Water-softening point, over 160° F.
[6] Cresols, cresylic acid, pitch coke, resin oil, road tar, tar paint, and topped or refined tar.
[7] Includes small amount of ammonium thiocyanate.
[8] Includes gas used for heating ovens and gas wasted.
[9] 233,983,106 gallons refined by coke-oven operators to make derived products shown.

TABLE 44.—Average value of coal-chemical materials used and sold and of coke and breeze produced per ton of coal carbonized in the United States, 1947–49 (average) and 1951–54

Product	1947–49 (average)	1951	1952	1953	1954
Ammonia and its compounds..............................	$0. 356	$0. 352	$0. 391	$0. 376	$0. 422
Light oil and its derivatives (including naphthalene)...........	. 451	. 830	. 808	. 875	. 871
Surplus gas sold or used..................................	1. 292	1. 353	1. 353	1. 408	1. 519
Tar and its derivatives:					
Sold..	. 501	. 597	. 594	. 609	. 622
Tar burned by producers..................................	. 130	. 107	. 123	. 127	. 190
Other products..	. 020	. 036	. 036	. 035	. 019
Total...	2. 750	3. 275	3. 305	3. 430	3. 643
Coke produced...	8. 488	9. 945	10. 178	10. 296	11. 115
Breeze produced...	. 191	. 194	. 204	. 215	. 236
Grand total...	11. 429	13. 414	13. 687	13. 941	14. 994

TABLE 45.—Percentage of value of coal recovered by coal-chemical materials in the United States, 1947–49 (average) and 1951–54

	Coal value recovered (percent)				
	1947–49 (average)	1951	1952	1953	1954
Product:					
Ammonia and its compounds	4.6	3.9	4.2	4.0	4.7
Light oil and its derivatives (including naphthalene)	5.8	9.3	8.7	9.5	9.7
Surplus gas sold or used	16.6	15.1	14.7	15.2	16.9
Tar and its derivatives	6.4	7.9	7.8	6.6	6.9
Other products	.2	.4	.4	.4	.2
Total	33.6	36.6	35.8	35.7	38.4
Value of coal per net ton	$7.79	$8.94	$9.23	$9.24	$9.00

TABLE 46.—Coal equivalent of the thermal materials, except coke, produced at oven-coke plants in the United States, 1913, 1918, 1929, 1939, 1947–49 (average), and 1951–54

Year	Materials produced				Estimated equivalent in heating value [1] (billion B. t. u.)					Coal equivalent (thousand net tons)
	Coke breeze (thousand net tons)	Surplus gas (billion cubic feet)	Tar (thousand gallons)	Light oil (thousand gallons)	Coke breeze	Surplus gas	Tar	Light oil	Total	
1913	735	64	115,145	3,000	14,700	35,200	17,272	390	67,562	2,600
1918	1,999	158	263,299	87,562	39,980	86,900	39,495	11,383	177,758	6,785
1929	4,853	508	680,864	200,594	97,060	279,400	102,130	26,077	504,667	19,262
1939	3,354	434	554,406	170,963	67,080	238,700	83,161	22,225	411,166	15,693
1947–49 (avg.)	5,390	582	715,779	246,607	107,800	320,100	107,367	32,059	567,326	21,654
1951	5,126	653	795,311	284,497	102,520	359,150	119,297	36,985	617,952	23,586
1952	4,639	576	703,890	249,284	92,780	316,800	105,584	32,407	547,571	20,900
1953	5,253	673	828,729	295,725	105,060	370,150	124,309	38,444	637,963	24,350
1954	3,931	558	715,840	246,019	78,620	306,900	107,376	31,982	524,878	20,034

[1] Breeze, 10,000 B. t. u. per pound; gas, 550 B. t. u. per cubic foot; tar, 150,000 B. t. u. per gallon; and light oil, 130,000 B. t. u. per gallon.

COKE-OVEN GAS

Slot-type coke ovens produce more gas than all other types of gas-manufacturing equipment combined. After removal of ammonia, tar, and light oil approximately 17 percent by weight of the coal charged into ovens is recovered in the form of fuel gas. About one-third of the gas recovered is used to heat the ovens, and the remainder (surplus gas) is consumed by the producing companies as fuel under boilers and in integrated metallurgical operations by neighboring industrial plants, or is pumped through city mains for commerical and residential heating and cooking. The relative value of gas to coke-plant operators varies according to the type of establishment. Coke plants associated with iron and steel works can either sell some of their surplus gas to gas utilities or use the entire output in their own metallurgical furnaces, depending on business and economic conditions. In 1954 furnace plants used 90 percent of their surplus gas, mostly in open hearths and annealing furnaces. In spite of the large proportion used by the furnace plants, they still supplied two-fifths of the total quantity of coke-oven gas distributed through city mains.

Merchant oven-coke plants do not, as a rule, have as much flexibility in their gas operations as the furnace plants do. Consequently, whenever a merchant plant loses its market for gas, continued operation is difficult. When coke plants are owned by gas utilities, the substitution of natural gas for coke-oven gas only alters the kind of gas distributed by the utilities involved. Then if continued operation of the coke ovens is not feasible, they are retired permanently or sold to other interests, if the plant is located favorably to a large coke-consuming operation, such as a blast-furnace plant. In 1954 the proportion of surplus gas sold by merchant plants was about the same as in preceding years. However, the proportion of gas sold by both merchant and furnace plants to the total surplus was less. This illustrates the continuing trend, of a declining market for coke-oven gas, which started in 1948. The average value of coke-oven gas per 1,000 cubic feet increased slightly over 1953.

TABLE 47.—Production and distribution of coke-oven gas in the United States in 1954, by States, in thousand cubic feet

State	Produced		Used in heating ovens	Surplus sold or used			Wasted
	Total	Per ton of coal coked		Quantity	Value		
					Total	Average	
Alabama	73,194,127	10.07	33,935,412	37,610,763	$4,850,390	$0.129	1,647,952
California	11,982,812	11.22	1,016,381	10,864,305	(1)	(1)	102,126
Colorado	11,811,965	12.10	6,341,805	5,448,650	(1)	(1)	21,5 0
Illinois	31,677,235	9.87	10,041,383	20,933,231	3,933,444	.188	702,621
Indiana	115,363,727	9.97	38,705,302	74,311,221	17,328,263	.233	2,347,204
Maryland	45,322,190	10.66	9,193,061	35,618,840	(1)	(1)	510,289
Massachusetts	8,161,303	10.80	1,186,322	6,974,981	(1)	(1)	----------
Michigan	30,562,398	9.76	5,500,943	24,925,406	6,438,882	.258	136,049
Minnesota	12,210,880	10.76	4,898,609	7,075,830	1,794,713	.254	236,441
New Jersey	13,938,898	10.66	1,687,201	12,251,697	(1)	(1)	----------
New York	55,616,475	10.74	15,260,680	40,154,993	12,104,940	.301	200,802
Ohio	120,395,859	10.14	48,929,746	69,409,010	15,161,570	.218	2,057,103
Pennsylvania	231,206,075	10.05	88,768,827	140,734,180	34,677,423	.246	1,703,068
Tennessee	1,714,443	8.80	653,368	1,061,059	(1)	(1)	16
Texas	10,504,731	10.72	4,180,574	4,236,286	(1)	(1)	2,087,871
Utah	19,421,711	12.62	4,354,700	14,438,801	(1)	(1)	628,210
West Virginia	56,605,878	10.92	16,792,037	39,455,207	772,763	.172	358,634
Connecticut, Kentucky, Missouri, and Wisconsin	20,183,808	10.08	7,044,210	12,838,687	4,016,111	.313	300,911
Undistributed	----------	----------	----------	----------	21,487,415	.236	----------
Total 1954	869,874,515	10.28	298,490,561	558,343,147	128,565,914	.230	13,040,807
At merchant plants	102,879,904	10.01	29,134,730	72,828,718	27,371,012	.376	916,456
At furnace plants	766,994,611	10.31	269,355,831	485,514,429	101,194,902	.208	12,124,351
Total 1953	1,069,140,519	10.19	374,188,278	672,956,650	147,727,356	.220	21,995,591

[1] Included with "Undistributed" to avoid disclosure of individual company figures.

TABLE 48.—Surplus coke-oven gas sold and used by producers in the United States in 1954, by States, in thousand cubic feet

State	Used by producers—						Sold					
	Under boilers			In steel or allied plants			Distributed through city mains			For industrial purposes		
	Quantity	Value		Quantity	Value		Quantity	Value		Quantity	Value	
		Total	Average		Total	Average		Total	Average		Total	Average
Alabama	9,984,799	$1,215,479	$0.122	21,254,088	$2,960,606	$0.139	5,108,353	$539,501	$0.106	1,263,523	$134,804	$0.107
California	1,793,605	(1)	(1)	7,063,322	(1)	(1)	----------	----------	----------	2,007,378	(1)	(1)
Colorado	----------	----------	----------	5,448,650	(1)	(1)	----------	----------	----------	----------	----------	----------
Illinois	3,380,396	400,504	.118	7,225,217	(1)	(1)	9,770,736	2,252,012	.230	556,882	(1)	(1)
Indiana	6,754,529	1,311,027	.194	51,588,557	10,533,779	.204	4,252,330	2,205,591	.519	11,715,805	3,277,866	.280
Maryland	----------	----------	----------	35,618,840	(1)	(1)	----------	----------	----------	----------	----------	----------
Massachusetts	----------	----------	----------	743	(1)	(1)	6,974,238	(1)	(1)	----------	----------	----------
Michigan	1,092,407	(1)	(1)	22,844,523	5,963,117	.261	----------	----------	----------	988,476	(1)	(1)
Minnesota	378,963	67,567	.178	3,478,395	756,874	.218	2,399,190	(1)	(1)	819,282	(1)	(1)
New Jersey	100	(1)	(1)	----------	----------	----------	12,251,597	(1)	(1)	----------	----------	----------
New York	1,865,064	510,809	.274	26,002,034	(1)	(1)	12,002,790	4,428,950	.369	285,105	(1)	(1)
Ohio	6,189,614	1,335,433	.216	56,809,784	12,767,878	.225	3,119,702	(1)	(1)	3,289,910	(1)	(1)
Pennsylvania	8,776,426	(1)	(1)	118,131,510	25,794,647	.218	13,820,483	7,220,158	.522	5,761	(1)	(1)
Tennessee	252,750	(1)	(1)	----------	----------	----------	808,309	(1)	(1)	----------	----------	----------
Texas	----------	----------	----------	4,024,202	(1)	(1)	----------	----------	----------	212,084	(1)	(1)
Utah	8,151	(1)	(1)	14,425,409	(1)	(1)	----------	----------	----------	5,241	(1)	(1)
West Virginia	3,327,651	312,031	.094	34,720,700	6,324,012	.182	874,548	(1)	(1)	532,308	(1)	(1)
Connecticut, Kentucky, Missouri, and Wisconsin	2,156,589	303,991	.141	----------	----------	----------	5,350,000	2,947,850	.551	5,332,098	764,270	.143
Undistributed	----------	2,278,733	.191	----------	18,830,101	.189	----------	11,758,587	.445	----------	1,369,737	.157
Total 1954	45,961,044	7,735,574	.168	408,635,974	83,931,014	.205	76,732,276	31,352,649	.409	27,013,853	5,546,677	.205
At merchant plants	8,411,613	1,254,520	.149	6,970,125	1,441,279	.207	45,926,187	22,635,476	.493	11,520,793	2,039,737	.177
At furnace plants	37,549,431	6,481,054	.173	401,665,849	82,489,735	.205	30,806,089	8,717,173	.283	15,493,060	3,506,940	.226
Total 1953	53,748,111	7,573,669	.141	480,541,315	93,915,597	.195	99,523,061	39,011,656	.392	39,144,163	7,226,434	.185

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[1] Included with "Undistributed" to avoid disclosure of individual company figures.

TABLE 49.—Coke-oven gas and other gases used in heating coke ovens in 1954, by States, in thousand cubic feet [1]

State	Coke-oven gas	Producer gas	Blue-water gas	Blast-furnace gas	Other gases [2]	Total coke-oven gas equivalent
Alabama	33,935,412				975,162	34,910,574
California	1,016,381			4,039,919		5,056,300
Colorado	6,341,805					6,341,805
Illinois	10,041,383			4,039,902	1,157,784	15,239,069
Indiana	38,705,302			10,635,189	1,800,275	51,140,766
Maryland	9,193,061			8,644,990		17,838,051
Massachusetts	1,186,322	2,143,866				3,330,188
Michigan	5,500,943			8,332,292		13,833,235
Minnesota	4,898,609		155,876			5,054,485
New Jersey	1,687,201	2,644,404			1,559,178	5,890,783
New York	15,260,680	1,445,794		7,133,845	581,473	24,421,792
Ohio	48,929,746			2,090,443	11,156	51,031,345
Pennsylvania	88,768,827	3,213,196		3,930,649	24,520	95,937,192
Tennessee	653,368					653,368
Texas	4,180,574					4,180,574
Utah	4,354,700			2,732,022		7,086,722
West Virginia	16,792,037			4,790,900	1,836,217	23,419,154
Connecticut, Kentucky, Missouri, and Wisconsin	7,044,210	1,903,729			8,701	8,956,640
Total 1954	298,490,561	11,350,989	155,876	56,370,151	7,954,466	374,322,043
At merchant plants	29,134,730	10,312,289			7,348,004	46,795,023
At furnace plants	269,355,831	1,038,700	155,876	56,370,151	606,462	327,527,020
Total 1953	374,188,278	14,458,162	19,555	53,198,563	7,059,284	448,923,842

[1] Adjusted to an equivalent of 550 B. t. u. per cubic foot.

[2] Natural, refinery-oil, and spillage gases.

CRUDE COAL TAR AND DERIVATIVES

Crude tar is a black, viscous liquid that condenses from the volatile matter during the carbonization of coal. The yield of tar varies widely among the various coke plants, depending on the kind of coal carbonized, oven temperature, completeness of tar recovery, and other factors. The yield of tar in 1954 improved markedly over 1953, rising from 7.90 gallons to 8.46 per ton of coal carbonized. This was the highest tar yield since 1941 and was no doubt caused by the general reduction in over temperatures at most plants. The accompanying table shows the high-volatile coals of the Western States rank high in tar yield, as do the coals carbonized in West Virginia and Pennsylvania. Coke plants in Pennsylvania produced 32 percent of the crude tar in 1954, whereas this State produced only 26 percent of the oven coke.

Crude tar has a high calorific content and may be used as a fuel in industrial furnaces or fractionally distilled into various tar products. Small coke plants cannot as a rule profitably erect and operate tar-distilling plants. The larger coke plants usually are associated with iron and steel works and burn, sell, or distill the crude tar, depending on the economics involved. The spectacular growth of the chemicals industry in recent years has increased the requirements of coal-tar crudes and created more interest in the processing of crude tar. In 1954 several tar-distillation plants at furnace oven-coke plants began operation. In such plants the tar can be processed to remove tar acids, bases, and naphthalene, and the residue or pitch can still be utilized as fuel in metallurgical furnaces.

TABLE 50.—Coke-oven tar produced, used by producers, and sold in the United States in 1954, by States, in gallons

State	Produced		Used by producers—			Sold for refining into tar products [2]			On hand Dec. 31
	Total	Per ton of coal coked	For refining or topping [1]	Burned as fuel	Used otherwise	Quantity	Value		
							Total	Average	
Alabama	57,593,558	7.93	9,111,169	11,103,096	166,331	36,888,581	$3,883,280	$0.105	2,381,603
California	9,803,419	9.18	------	------	------	9,639,419	(3)	(3)	510,901
Colorado	9,780,116	10.02	6,253,150	3,031,779	191,312	256,642	(3)	(3)	583,638
Illinois	23,106,642	7.20	9,231,600	------	347,100	21,510,917	2,451,091	.114	1,067,482
Indiana	71,153,605	6.15	11,802,997	6,586,055	400,251	52,645,173	5,624,109	.107	3,981,348
Maryland	35,590,371	8.37	------	34,561,246	------	1,017,701	(3)	(3)	1,779,996
Massachusetts	6,414,522	8.49	------	------	------	6,414,940	(3)	(3)	86,477
Michigan	22,478,852	7.18	------	------	495	22,879,328	2,419,196	.106	1,037,618
Minnesota	8,268,354	7.29	------	226,024	------	8,145,368	813,872	.100	682,096
New Jersey	11,110,032	8.49	------	------	731,199	10,189,833	(3)	(3)	312,000
New York	42,667,661	8.24	24,377,971	------	150,869	19,184,890	2,111,781	.110	1,512.988
Ohio	95,941,896	8.08	4,975,218	19,990,999	230,021	71,175,780	7,633,777	.107	4,451,730
Pennsylvania	229,259,617	9.96	134,374,598	60,683,038	117,757	32,532,553	3,436,681	.106	8,982,936
Tennessee	1,590,771	8.17	------	------	------	1,594,169	(3)	(3)	49,242
Texas	6,496,908	6.63	------	------	42,615	6,468,803	(3)	(3)	299,211
Utah	15,919,452	10.35	------	10,600,689	988	5,007,121	(3)	(3)	1,248,432
West Virginia	53,116,962	10.25	16,519,035	------	36,801	36,034,557	4,007,751	.111	1,334,442
Connecticut, Kentucky, Missouri, and Wisconsin	15,547,735	7.76	1,523,734	------	------	14,292,894	1,644,230	.115	521,651
Undistributed	------	------	------	------	------	------	4,461,414	.110	------
Total 1954	715,840,473	8.46	218,169,472	146,782,926	2,415,739	355,878,669	38,487,182	.108	30,823,791
At merchant plants	80,124,452	7.80	2,265,078	------	782,199	77,295,317	8,449,439	.109	3,215,987
At furnace plants	635,716,021	8.55	215,904,394	146,782,926	1,633,540	278,583,352	30,037,743	.108	27,607,804
Total 1953	828,728,761	7.90	254,448,498	127,332,894	2,372,924	[4] 448,504,349	46,070,522	.103	33,494,891

[1] Includes 5,848,047 gallons also shown under "Sold for refining into tar products."

[2] Comprises 28,059,083 gallons valued at $3,062,492 sold to affiliated companies and 327,819,586 gallons valued at $35,424,690 sold to other purchasers

[3] Included with "Undistributed" to avoid disclosure of individual company figures.

[4] Includes 16,990,805 gallons sold for fuel.

COKE-OVEN AMMONIA

Ammonia evolved during the carbonization of coal is recovered at coke plants either as a water solution (ammonia liquor) or as a crystallized sulfate of ammonia. At the end of 1954 it appeared that the coke industry might soon be producing another ammonia product, diammonium phosphate (see section on Technology), but no commercial output was reported in 1954. One plant which produced ammonium sulfate also made ammonium thiocyanate, but production figures for this product cannot be shown. In 1954, 80 of the 82 active oven-coke plants recovered ammonia; 67 made ammonium sulfate and 15, ammonia liquor; and 2 plants produced both sulfate and liquor. About 93 percent of the total ammonia produced was recovered as ammonium sulfate and used almost exclusively for agricultural purposes. The merchant-coke plants recover a larger proportion of their ammonia as an aqueous solution (ammonia liquor) and produced nearly two-thirds of the total liquor output in 1954. Ammonia liquor produced by coke-plant operators is utilized for chemical and agricultural purposes. Although data are not available on the quantity of ammonia liquor used for each purpose, it is estimated that over half is consumed industrially in manufacturing soda ash, ammonium chloride, and sulfuric acid.

CRUDE LIGHT OIL AND DERIVATIVES

Crude light oil was scrubbed from coke-oven gas by 77 of the 82 active oven-coke plants in 1954. Crude light oil can also be obtained by distilling crude coal tar; but this method is not practiced in the coke industry, as the yield of light oil in most instances is too small to justify the cost of separation. The light-oil yield increased almost 0.1 gallon per ton of coal carbonized and averaged 2.98 for the industry, the highest yield since 1939, when the yield was 2.99 gallons. Lower oven temperatures, improved equipment, and better coal were factors in increasing the yield. In addition to the crude light oil, 12 plants produced 2,907,059 gallons of intermediate light oil. This product, which is sold to chemical companies for processing, distills between roughly 150° and 200° C. and contains coumarone, indene, dicyclopentadiene, polyalkylbenzenes, and naphthalene. An analysis of table 52 shows that light-oil yields are related to tar yields, and the States having the highest tar yield also led in light-oil recovery.

Crude light oil is usually processed by the producing companies in integrated facilities. Most oven-coke plants have a benzol plant which fractionally distills light oil into benzene, toluene, and xylene. Saleable products recovered from the distillation usually range between 80 and 90 percent. The difference between the total of refined products and crude-light-oil input represents loss in processing and residue. The still residue in some instances is mixed with tar and used as fuel.

The principal derivative of light oil is benzene, one of our most important aromatic chemical raw materials used in the chemical industry. Roughly two-thirds of the light oil distilled is recovered as benzene. Benzene used to produce intermediate products and as a solvent must meet rigid standards and is referred to as specification

TABLE 51.—Coke-oven ammonia produced and sold in the United States in 1954, by States, in pounds

State	Active plants[1]	Produced				Sold—				On hand Dec. 31	
		Sulfate equivalent	Per ton of coal coked	As sulfate	As liquor (NH_3 content)	As sulfate		As liquor (NH_3 content)		Sulfate	Liquor (NH_3 content)
						Quantity	Value	Quantity	Value		
Alabama	7	173,949,117	23.94	164,417,037	2,383,020	185,264,620	$3,943,615	2,382,818	(2)	28,560,243	51,188
California	1	24,613,057	23.04	24,613,057		21,948,690	(2)			8,457,294	
Colorado	1	19,998,450	20.48	19,998,450		22,972,164	(2)			4,291,936	
Illinois	7	65,459,886	20.97	[3] 86,927,286		81,209,074	1,844,665			16,700,218	
Indiana	5	198,597,605	17.16	[3] 172,275,457	1,213,687	157,281,240	3,650,086	598,039	(2)	40,873,730	692,288
Maryland	1	87,283,595	20.52	87,283,595		84,798,630	(2)			8,426,500	
Massachusetts	1	15,822,964	20.94	13,847,600	403,841	18,767,580	(2)	496,451	(2)	165,520	15,619
Michigan	4	62,132,548	19.85	23,322,616	9,702,483	25,106,976	(2)	3,798,159	(2)	1,664,140	771,598
Minnesota	3	20,757,089	18.30	20,757,089		18,876,160	431,676			3,114,197	
New Jersey	2	25,667,864	19.63	25,667,864		25,376,440	(2)			2,895,680	
New York	5	124,509,710	24.04	108,633,546	3,969,041	116,002,440	2,364,729	16,663	(2)	9,068,720	86,521
Ohio	16	244,207,687	20.56	213,579,759	7,656,982	227,835,016	4,843,114	5,952,741	$252,459	30,341,833	1,031,174
Pennsylvania	14	501,994,556	21.81	500,362,740	407,954	486,477,215	9,726,684	407,744	(2)	118,926,346	28,380
Tennessee	1	4,654,500	23.90	4,654,500		4,945,920	(2)			72,480	
Texas	2	22,959,954	23.43	22,959,954		24,502,420	(2)			1,647,672	
Utah	2	41,852,634	27.20	41,852,634		26,469,214	(2)			19,463,242	
West Virginia	4	102,335,817	21.52	102,335,817		99,466,875	1,936,031			16,846,591	
Connecticut, Kentucky, Missouri, and Wisconsin	4	37,667,631	18.81	12,147,399	6,380,058	11,666,719	248,200	5,943,644	251,618	1,076,080	392,593
Undistributed							5,655,987		562,165		
Total 1954	90	1,774,464,664	21.09	1,645,636,400	32,207,066	1,638,967,393	34,644,877	19,596,259	1,066,242	312,592,422	3,069,361
At merchant plants	22	208,613,656	21.37	126,089,792	20,630,966	139,385,689	2,958,433	15,033,439	854,019	7,542,492	2,180,822
At furnace plants	58	1,565,851,008	21.06	1,519,546,608	11,576,100	1,499,581,704	31,686,444	4,562,820	212,223	305,049,930	888,539
Total 1953	80	2,091,032,132	20.09	1,892,266,104	49,691,507	1,678,791,696	37,726,492	39,267,730	1,658,366	315,177,365	1,615,979

[1] Number of plants that recovered ammonia.
[2] Included with "Undistributed" to avoid disclosure of individual company figures.
[3] Difference between actual production of sulfate and sulfate equivalent due to transfer of liquor from Indiana for conversion into sulfate in Illinois by same producing company.

grades. The most important grades are nitration (1° C.) and industrial (2° C.), which are used mainly for manufacturing intermediate organic chemical products; these in turn are used to manufacture resins, drugs, dyestuffs, pharmaceuticals, and explosives.

In 1954 the Chemical and Rubber Division, Business and Defense Services Administration, made a canvass of the capacity, production, and consumption of benzene, by uses. Data on capacity and production of coke-oven benzene were supplied to that agency by the Bureau of Mines. Table 55 contains data compiled by BDSA on the principal uses of benzene. Styrene production consumed the largest quantity of benzene in 1954, although the total consumed was less than in 1953. The second largest use of benzene is in the production of synthetic phenol, which increased in 1954 over 1953.

Benzene production at coke plants decreased 20 percent from 1953 because of the substantial decrease in crude-light-oil output resulting from the reduction in oven operation already mentioned in previous sections of this chapter. Although coal carbonization was the sole source of benzene during World War II and in the immediate postwar years, a large part of the 1954 supply in the United States was obtained from the cracking and re-forming of petroleum. Based on preliminary data published by the United States Tariff Commission, it appeared that about 60 percent of the benzene produced from raw materials originating in the United States came from coal. Toluene and

TABLE 52.—Coke-oven crude light oil produced in the United States and derived products produced and sold in 1954, by States, in gallons

State	Active plants [1]	Crude light oil				Derived products		
		Produced	Per ton of coal coked	Refined on premises [2]	On hand Dec. 31	Produced	Sold [3]	
							Quantity	Value
Alabama	7	19, 579, 995	2. 69	19, 188, 750	291, 852	15, 755, 510	15, 670, 543	$5, 874, 889
California	1	3, 631, 564	3. 40	3, 629, 307	10, 800	2, 837, 388	2, 667, 586	(4)
Colorado	1	3, 567, 176	3. 65	3, 560, 579	34, 241	3, 030, 913	2, 955, 137	(4)
Illinois	7	8, 594, 982	2. 75	6, 454, 926	190, 506	5, 351, 775	4, 864, 359	1, 740, 416
Indiana	5	29, 838, 498	2. 70	29, 508, 776	505, 387	24, 673, 060	23, 617, 210	8, 980, 175
Maryland	1	13, 361, 635	3. 14	13, 422, 126	176, 173	11, 479, 177	11, 633, 422	(4)
Massachusetts	1	2, 152, 266	2. 85	3, 308, 270	65, 895	2, 708, 566	2, 492, 629	(4)
Michigan	4	8, 966, 550	2. 86	5, 384, 333	151, 232	4, 704, 843	4, 207, 381	1, 534, 474
New Jersey	1	2, 791, 402	3. 02	----------	26, 630	----------	----------	----------
New York	5	15, 833, 298	3. 06	21, 115, 619	272, 197	18, 269, 261	13, 983, 937	5, 128, 109
Ohio	16	34, 772, 821	2. 93	33, 225, 593	635, 760	26, 109, 302	25, 341, 268	8, 847, 921
Pennsylvania	14	72, 682, 464	3. 16	70, 516, 026	1, 209, 785	58, 522, 757	55, 942, 332	19, 880, 225
Tennessee	1	565, 384	2. 90	564, 123	6, 300	475, 502	352, 525	(4)
Texas	2	2, 690, 683	2. 75	2, 696, 320	5, 422	2, 279, 618	2, 272, 265	(4)
Utah	2	5, 875, 563	3. 82	5, 827, 571	128, 874	5, 313, 573	4, 306, 802	(4)
West Virginia	5	15, 809, 749	3. 05	13, 988, 252	138, 135	11, 856, 310	10, 768, 523	3, 787, 525
Connecticut, Kentucky, Missouri, and Wisconsin	4	5, 304, 597	2. 65	1, 592, 535	232, 582	1, 392, 177	1, 376, 357	469, 971
Undistributed	--------	----------	--------	----------	--------	----------	----------	9, 623, 293
Total 1954	77	246, 018, 627	2. 98	233, 983, 106	4, 081, 771	194, 759, 732	182, 452, 276	65, 866, 998
At merchant plants	21	23, 827, 235	2. 63	17, 724, 739	962, 446	15, 246, 240	9, 060, 542	3, 114, 834
At furnace plants	56	222, 191, 392	3. 03	216, 258, 367	3, 119, 325	179, 513, 492	173, 391, 734	62, 752, 164
Total 1953	76	295, 725, 435	2. 90	278, 905, 871	4, 089, 341	237, 100, 301	228, 084, 964	82, 826, 259

[1] Number of plants that recovered crude light oil.

[2] Includes small percentage of material also shown under "Sold as crude light oil."

[3] Excludes 14,647,521 gallons of crude light oil valued at $3,495,456 sold as such.

[4] Included with "Undistributed" to avoid disclosure of individual company figures.

xylene are other light-oil derivatives that were previously produced by the carbonization of coal, but are now made chiefly from petroleum. The 33,383,028 and 9,956,303 gallons of toluene and xylene, respectively, made at coke plants in 1954 were roughly 22 and 8 percent of the total United States production of these aromatic chemicals.

Prices of the light-oil products fluctuated little from 1953, although the market quotation for benzene declined in the last several months of the year.

TABLE 53.—Yield of light-oil products from refining crude light oil at oven-coke plants in the United States, 1929, 1939, 1947–49 (average), and 1951–54, in percent

Year	Benzene		Toluene, crude and refined	Xylene, crude and refined	Solvent naphtha	Other light-oil products
	Motor	All other grades				
1929	54.4	12.8	9.4	(1)	3.7	3.4
1939	48.6	15.4	12.1	2.5	2.9	3.8
1947–49 (average)	6.5	59.2	11.7	3.1	2.3	3.3
1951	1.9	63.9	12.7	3.4	2.2	2.6
1952	(2)	65.4	12.9	3.4	2.0	2.6
1953	.4	63.7	12.9	3.6	[3] 2.3	2.2
1954	1.4	59.6	14.3	4.3	2.0	1.7

[1] Included with solvent naphtha.
[2] Included with "Other light-oil products" to avoid disclosure of individual company figures.
[3] Revised figure.

TABLE 54.—Benzene and toluene produced at oven-coke plants in the United States, 1941, 1947–49 (average), and 1951–54, by grades, in gallons

Year	Benzene				Toluene		
	Motor	Nitration or 1° C.	Pure commercial or 2° C.	All other	Nitration or 1° C.	Pure commercial or 2° C.	All other
1941	106,372,000	15,414,500	18,286,400	4,182,600	14,689,800	13,268,500	1,378,900
1947–49 (average)	15,246,900	38,335,100	98,395,100	2,535,900	21,407,400	5,529,200	568,600
1951	5,103,700	45,057,500	123,315,700	4,476,100	24,772,500	8,689,700	839,300
1952	(1)	46,211,300	104,030,800	4,872,200	21,342,000	7,613,400	1,567,100
1953	1,160,000	51,566,400	120,939,500	5,086,900	26,834,400	8,330,500	871,600
1954	3,327,100	44,383,000	92,336,600	2,718,200	24,718,800	7,775,600	888,600

[1] Withheld to avoid disclosure of individual company figures.

TABLE 55.—Consumption of commercial benzene (excluding motor grade) in the United States, 1953–54, by uses, in thousand gallons

[Chemical and Rubber Division, Business and Defense Services Administration]

Use	1954 [1]	1953	Use	1954 [1]	1953
Monochlorobenzene [2]	2,500	2,733	DDT	9,400	8,589
Dichlorobenzene [2]	5,900	6,559	Synthetic detergents	24,600	23,631
Aniline	11,900	13,888	Exports [3]	6,100	1,240
Maleic anhydride and acid	6,000	6,376	Miscellaneous [4]	36,700	[5] 37,800
Phenol	51,300	47,832			
Styrene	84,800	97,301	Total	244,200	[5] 250,978
Benzene hexachloride	5,000	5,029			

[1] Estimated.
[2] Refers to chlorobenzene (di and mono) for uses other than as an intermediate for phenol, aniline, and DDT.
[3] As reported by the U. S. Department of Commerce.
[4] Several end uses of benzene combined to avoid disclosure of individual company figures such as: synthetic fibers, nitrobenzene for uses other than as an intermediate for aniline and DDT, diphenyls, solvents, paint removers, denaturant for ethyl alcohol, and other miscellaneous uses.
[5] Partly estimated.

TABLE 56.—Production and sales of light-oil derivatives at coke ovens in the United States in 1954, by States, in gallons

State	Benzene (all grades)				Toluene (all grades)				Xylene (all grades)				Solvent naphtha (crude and refined)			
	Production	Yield from crude light oil refined (percent)	Sales		Production	Yield from crude light oil refined (percent)	Sales		Production	Yield from crude light oil refined (percent)	Sales		Production	Yield from crude light oil refined (percent)	Sales	
			Quantity	Value			Quantity	Value			Quantity	Value			Quantity	Value
Alabama	11, 832, 629	61. 7	11, 855, 846	$4, 724, 359	2, 581, 698	13. 5	2, 458. 173	$787, 510	742. 121	3. 9	727, 386	$239, 652	405, 632	2. 1	418. 197	$106, 456
California	2, 001, 870	55. 2	1, 909, 744	(1)	583, 609	16. 1	505. 662	(1)	165. 577	4. 6	161. 546	(1)	86, 332	2. 4	90. 634	(1)
Colorado	2, 231, 395	62. 7	2, 209. 832	(1)	458, 975	12. 9	458. 348	(1)	161, 078	4. 5	125, 537	(1)	179, 465	5. 0	161, 420	(1)
Illinois and Missouri	4, 474, 084	63. 3	4, 050, 359	1, 540, 661	907, 615	12. 8	844, 004	282, 622	208, 376	2. 9	189, 306	64, 853	94, 878	1. 3	100, 128	25, 089
Indiana	20, 638, 561	69. 9	19, 891, 455	7, 768, 378	2, 922, 636	9. 9	2, 901, 836	956, 060	617, 890	2. 1	596, 721	204, 367	217, 877	. 7	227, 198	51, 370
Maryland	8, 779, 743	65. 4	8, 883, 269	(1)	2, 067, 388	15. 4	2, 081, 992	(1)	632, 046	4. 7	668, 161	(1)	--------	------	--------	--------
Massachusetts	2, 004, 696	60. 6	1, 828, 160	(1)	498, 667	15. 1	464, 950	(1)	138, 790	4. 2	139, 167	(1)	66, 413	2. 0	60, 352	(1)
Michigan and Wisconsin	4, 220, 033	66. 3	3, 784, 324	1, 443, 627	877, 247	13. 8	876, 365	283, 224	248. 947	3. 9	216, 396	73. 955	--------	------	--------	--------
New York	13, 505, 627	64. 0	10, 135, 144	3, 978, 303	3, 111, 686	14. 7	2, 296, 072	750, 414	753, 782	3. 6	658, 562	267, 052	90, 900	. 4	90, 698	(1)
Ohio	19, 244, 323	57. 9	19, 271, 765	6, 995, 316	4, 399, 416	13. 2	4, 105, 438	1, 326, 911	1, 465, 323	4. 4	1, 338, 975	401, 932	509, 884	1. 5	488, 396	115, 959
Pennsylvania	40, 079, 654	56. 8	38, 803, 662	14, 667, 641	11, 320, 657	16. 1	10, 153, 858	3, 177, 730	3, 805, 002	5. 4	3, 722, 169	1, 213, 970	2, 531, 841	3. 6	2, 558, 870	711, 341
Tennessee	282, 272	50. 0	147, 437	(1)	105, 057	18. 6	119, 165	(1)	45, 193	8. 0	38, 153	(1)	--------	------	--------	--------
Texas	1, 812, 711	67. 2	1, 822, 574	(1)	318, 218	11. 8	300, 592	(1)	78, 238	2. 9	75, 331	(1)	70, 451	2. 6	73, 768	(1)
Utah	3, 307, 316	56. 8	2, 929, 178	(1)	984, 952	16. 9	992, 442	(1)	220, 884	3. 8	232, 974	(1)	156, 208	2. 7	152, 208	(1)
West Virginia	8, 349, 968	59. 7	7, 589, 482	2, 863, 627	2, 245, 207	16. 1	1, 989, 034	611, 856	673, 056	4. 8	636, 803	205, 613	172, 901	1. 2	138, 026	26, 450
Undistributed	--------	------	--------	7, 547, 477	--------	------	--------	1, 487, 649	--------	------	--------	449, 315	--------	------	--------	160, 541
Total 1954	142, 764, 882	61. 0	135, 112, 231	51, 529, 389	33, 383, 028	14. 3	30, 547, 931	9, 663, 976	9, 956, 303	4. 3	9, 527, 187	3, 120, 709	4, 582, 782	2. 0	4, 559, 895	1, 197, 206
At merchant plants	10, 385, 397	58. 6	5, 499, 279	2, 157, 983	2, 736, 365	15. 4	1, 647, 049	565, 199	762, 834	4. 3	606, 792	211, 581	249, 917	1. 4	228, 237	52, 462
At furnace plants	132, 379, 485	61. 2	129, 612, 952	49, 371, 406	30, 646, 663	14. 2	28, 900, 882	9, 098, 777	9, 193, 469	4. 3	8, 920, 395	2, 909, 128	4, 332, 865	2. 0	4, 331, 658	1, 144, 744
Total 1953	178, 752, 808	64. 1	173, 555, 426	66, 662, 786	36, 036, 486	12. 9	35, 444, 655	11, 074, 653	9, 928, 224	3. 6	9, 759, 168	3, 118, 497	6, 235, 346	[2] 2. 3	6, 068, 379	1, 522, 532

[1] Included with "Undistributed" to avoid disclosure of individual company figures.
[2] Revised figure.

CRUDE NAPHTHALENE

The coke industry supplied the raw materials for nearly all naphthalene produced in the United States in 1954. This aromatic material, which was considered a nuisance at one time, has become one of the most important coal chemicals. The principal use of naphthalene is in manufacturing phthalic anhydride, which in turn is used to make alkyd resins and phthalate plasticizers. The alkyd resins are used mainly for automotive and other metal finishes, house and marine paints, surface coatings for military vehicles and equipment, and ammunition. Plasticized vinyl resins are the basis for vinyl film and sheets, floor coverings, coated fabrics, and inflatables. Other uses are in the manufacture of dyes, mothballs, and other insecticides, tanning agents, surfactants, oil additives, and medicinals. Naphthalene is recovered at coke plants from refining crude light oil or tar and to a smaller extent from the final coolers. The commercial grades of naphthalene are defined in terms of melting points. The crude grades range from 74° to 79° C. and are suitable for some industrial applications without further refining. Crude below 74° C. has virtually no direct commercial use and is sold by the coke-plant operators to tar refiners for upgrading or refining. In recent years several large coke plants have installed tar-refining facilities to remove naphthalene from the crude tar at the plant. Naphthalene recovered from light-oil refining, which was formerly sold to independent tar refiners for upgrading, is now processed by these companies in their new equipment. The change in quality of naphthalene produced by coke-oven operators is indicated in table 43. Over three-fourths of the crude naphthalene produced was of the better grades and was sold for direct application by the coke-oven operators.

TABLE 57.—Crude naphthalene produced and sold by coke-plant operators in the United States, 1947–49 (average) and 1951–54

Year	Produced (pounds)	Sold		
		Pounds	Value	
			Total	Average per pound
1947–49 (average)	90,969,911	84,134,022	$3,467,526	$0.041
1951	125,579,578	130,200,785	6,849,831	.053
1952	106,903,506	96,457,812	4,961,657	.051
1953	112,937,214	91,542,111	4,387,426	.048
1954	100,059,031	97,301,871	4,369,262	.045

COKE OVENS OWNED BY CITY GAS COMPANIES

(PUBLIC UTILITIES)

Data on the carbonization activities of oven-coke plants owned and operated by gas utilities are shown in table 58 which also provides comparable data for plants that are not owned by city gas companies. The manufacture of coke-oven gas by city gas companies has declined steadily in the past decade. In 1954 city gas companies produced less than 2 percent of the oven coke, 2 percent of the crude tar, 1 percent of the crude light oil, and 2 percent of the coke-oven gas produced in the United States. After the Consolidated Edison Co. of New York closed its Hunts Point, N. Y., plant in May 1954, only four coke plants were still operated by gas utilities. It appeared likely that several of these plants would also be shut down soon because the rapid increase in peak-load demands in certain areas precludes the mixing of natural gas with coke-oven gas.

TABLE 58.—Coke, breeze, and coal-chemical materials produced in the United States at oven-coke plants owned by city gas companies (public utilities)[1] compared with all other oven-coke plants, 1953–54

Product	1953			1954		
	Plants not owned by city gas companies	Plants owned by city gas companies (public utilities)	Total	Plants not owned by city gas companies	Plants owned by city gas companies (public utilities)	Total
Number of active plants	77	6	83	77	5	82
Coke:						
Produced……net tons	71, 235, 958	2, 357, 570	73, 593, 528	57, 924, 327	1, 137, 115	59, 061, 442
Value	$1, 037, 472, 389	$42, 831, 767	$1, 080, 304, 156	$920, 458, 615	$20, 310, 458	$940, 769, 073
Average per ton	$14. 56	$18. 17	$14. 68	$15. 89	$17. 86	$15. 93
Breeze:						
Produced……net tons	5, 046, 623	206, 864	5, 253, 487	3, 844, 927	85, 626	3, 930, 553
Sold……do	1, 342, 965	4, 011	1, 346, 976	825, 934	15, 911	841, 845
Value of sales	$7, 064, 600	$28, 601	$7, 093, 201	$4, 485, 269	$97, 589	$4, 582, 858
Average per ton	$5. 26	$7. 18	$5. 27	$5. 43	$6. 13	$5. 44
Coal carbonized:						
Bituminous……net tons	101, 358, 237	3, 290, 093	104, 648, 330	82, 840, 459	1, 570, 141	84, 410, 600
Anthracite……do	234, 007	40, 590	274, 597	190, 509	38, 864	229, 373
Total……do	101, 592, 244	3, 330, 683	104, 922, 927	83, 030, 968	1, 609, 005	84, 639, 973
Value	$933, 306, 490	$36, 001, 878	$969, 308, 368	$744, 523, 287	$16, 992, 968	$761, 516, 255
Average per ton	$9. 19	$10. 81	$9. 24	$8. 97	$10. 56	$9. 00
Coke—						
Used by producing companies:						
Net tons	61, 492, 268	390, 237	61, 882, 505	51, 906, 717	299, 106	52, 205, 823
Value	$866, 464, 199	$5, 512, 397	$871, 976, 596	$816, 450, 721	$4, 204, 583	$820, 655, 304
Commercial sales:						
Net tons	9, 309, 207	1, 796. 233	11, 105, 440	5, 761, 044	708, 111	6, 469, 155
Value	$162, 797, 192	$34, 326, 923	$197, 124, 115	$97, 399, 805	$13, 832, 704	$111, 232, 509
Coal-chemical materials:						
Tar:						
Produced……gallons	802, 044, 151	26, 684, 610	828, 728, 761	703, 333, 107	12, 507, 366	715, 840, 473
Sold……do	422, 028, 219	26, 476, 130	448, 504, 349	344, 048, 229	11, 830, 440	355, 878, 669
Value of sales	$43, 175, 826	$2, 894, 696	$46, 070, 522	$37, 158, 654	$1, 328, 528	$38, 487, 182
Ammonia:						
Produced (NH_3 equivalent of all forms)……pounds	507, 364, 578	15, 393, 455	522, 758, 033	435, 404, 307	8, 211, 859	443, 616, 166
Liquor (NH_3 content):						
Produced……do	48, 276. 077	1, 415, 430	49, 691, 507	31, 706, 259	500, 807	32, 207. 066
Sold……do	38, 258, 965	1, 008, 765	39, 267, 730	19, 154, 706	441, 553	19, 596, 259
Value of sales	$1, 623, 592	$34, 774	$1, 658, 366	$1, 050, 260	$15, 982	$1, 066, 242
Sulfate:						
Produced……pounds	1, 836, 354, 004	55, 912, 100	1, 892, 266, 104	1, 614, 792, 192	30, 844, 208	1, 645, 636, 400
Sold……do	1, 624, 457, 694	54, 334, 002	1, 678, 791, 696	1, 604, 380, 353	34, 587, 040	1, 638, 967, 393
Value of sales	$36, 501, 834	$1, 224, 658	$37, 726, 492	$33, 881, 689	$763, 188	$34, 644, 877

Gas:						
Produced……M cubic feet	1, 034, 329, 004	34, 811, 515	1, 069, 140, 519	853, 352, 703	16, 521, 812	869, 874, 515
Disposal of surplus:						
Used under boilers:						
M cubic feet	53, 634, 460	113, 651	53, 748, 111	45, 868, 537	92, 507	45, 961, 044
Value	$7, 539, 142	$34, 527	$7, 573, 669	$7, 720, 134	$15, 440	$7, 735, 574
Average per M cubic feet	$0. 141	$0. 304	$0. 141	$0. 168	$0. 167	$0. 168
Used in steel or allied plants:						
M cubic feet	480, 541, 315	---------------	480, 541, 315	408, 635, 974	---------------	408, 635, 974
Value	$93, 915, 597	---------------	$93, 915, 597	$83, 931, 014	---------------	$83, 931, 014
Average per M cubic feet	$0. 195	---------------	$0. 195	$0. 205	---------------	$0. 205
Distributed through city mains:						
M cubic feet	72, 270, 652	27, 252, 409	99, 523, 061	62, 443, 930	14, 288, 346	76, 732, 276
Value	$28, 106, 058	$10, 905, 598	$39, 011, 656	$23, 732, 979	$7, 619, 670	$31, 352, 649
Average per M cubic feet	$0. 389	$0. 400	$0. 392	$0. 380	$0. 533	$0. 409
Sold for industrial use:						
M cubic feet	37, 142, 817	2, 001, 346	39, 144, 163	25, 717, 498	1, 296, 355	27, 013, 853
Value	$6, 580, 832	$645, 602	$7, 226, 434	$5, 087, 985	$458, 692	$5, 546, 677
Average per M cubic feet	$0. 177	$0. 323	$0. 185	$0. 198	$0. 354	$0. 205
Crude light oil:						
Produced……gallons	292, 249, 185	3, 476, 250	295, 725, 435	244, 490, 397	1, 528, 230	246, 018, 627
Sold……do	14, 956, 294	3, 482, 114	18, 438, 408	13, 087, 039	1, 560, 482	14, 647, 521
Value of sales	$3, 861, 693	$754, 784	$4, 616, 477	$3, 173, 306	$322, 150	$3, 495, 456
Light oil derivatives:						
Produced……gallons	237, 100, 301	---------------	237, 100, 301	194, 759, 732	---------------	194, 759, 732
Sold……do	228, 084, 964	---------------	228, 084, 964	182, 452, 276	---------------	182, 452, 276
Value of sales	$82, 826, 259	---------------	$82, 826, 259	$65, 866, 998	---------------	$65, 866, 998
Naphthalene (crude):						
Produced……pounds	112, 937, 214	---------------	112, 937, 214	100, 059, 031	---------------	100, 059, 031
Sold……do	91, 542, 111	---------------	91, 542, 111	97, 301, 871	---------------	97, 301, 871
Value of sales	$4, 387, 426	---------------	$4, 387, 426	$4, 369, 262	---------------	$4, 369, 262
All other coal-chemical materials, value	$21, 388, 863	$117, 632	$21, 506, 495	$15, 707, 044	$40, 780	$15, 747, 824

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[1] Coke ovens built by city gas companies, some of which are operated in conjunction with coal- and water-gas plants. Does not include independent oven-coke plants that may sell gas to public-utility companies for distribution.

Fuel Briquets and Packaged Fuel

By J. A. DeCarlo and Maxine M. Otero

⁂

GENERAL SUMMARY

PRODUCTION of fuel briquets and packaged-fuel cubes or blocks continued to decline in 1954, a trend that began in 1949 for briquets and in 1941 for packaged fuel. Output of fuel briquets dropped 9 percent from 1953 and packaged fuel 3 percent; consequently, production of each of these processed fuels was the lowest in 15 years. Both fuels are used principally for space heating in the United States, and little, if any, is used industrially. The volume of production, therefore, depends on the demand of homeowners. In recent years oil and natural gas have made heavy inroads into fuel markets formerly served by briquets and packaged fuel, primarily because consumer prices for briquets and packaged fuel have risen faster than natural-gas prices. The annual index of retail prices of specified fuels and electricity, published by the Bureau of Labor Statistics, show that the index number for natural gas (1947–49=100) climbed from 101.2 in 1935 to 109.3 in 1954. In this same period the index numbers for bituminous coal and anthracite, the two principal raw materials used to make briquets and packaged fuel, rose from 54.4 to 119.2 and from 58 to 128.9, respectively. The large gains in consumer prices for these solid fuels have weakened their competitive position in residential heating. A great number of hand-fired furnaces and other heating equipment are in use, however, for which briquets and packaged-fuel cubes are ideally suited, and the cleanliness and ease of handling still make them attractive.

Low-volatile bituminous coal was the principal raw material used in both fuel-briquet and packaged-fuel manufacture in 1954. Other raw fuels were: High-volatile bituminous coal, anthracite, semianthracite, petroleum coke, and residual carbon from the manufacture of oil gas.

Briquets and packaged fuel differ widely, however, in the kind of binding material used. Petroleum asphalt is the principal binder used in making briquets, whereas starches from wheat, corn, and even potatoes are used in making packaged fuel. In the manufacture of briquets an average of 140 pounds of asphaltic binder was used per ton of raw fuel, whereas only 13 pounds of starch per ton was used in making packaged fuel. It was estimated that the briquet industry used about 105,000 tons of petroleum asphalt and packaged-fuel producers about 400 tons of starches.

The total value of briquet production declined 9 percent and of packaged fuel 5 percent from 1953, because of decreased output and a slightly lower average unit value. The value of briquets dropped $0.06 per ton f. o. b. plant and packaged fuel $0.40. The average unit value for packaged fuel was considerably higher than for briquets because of higher material and manufacturing costs and because of a difference in marketing methods. Nearly all packaged fuel is sold by retailers to ultimate consumers in small lots, whereas a substantial part of the fuel-briquet output is sold by producers to wholesalers and retailers.

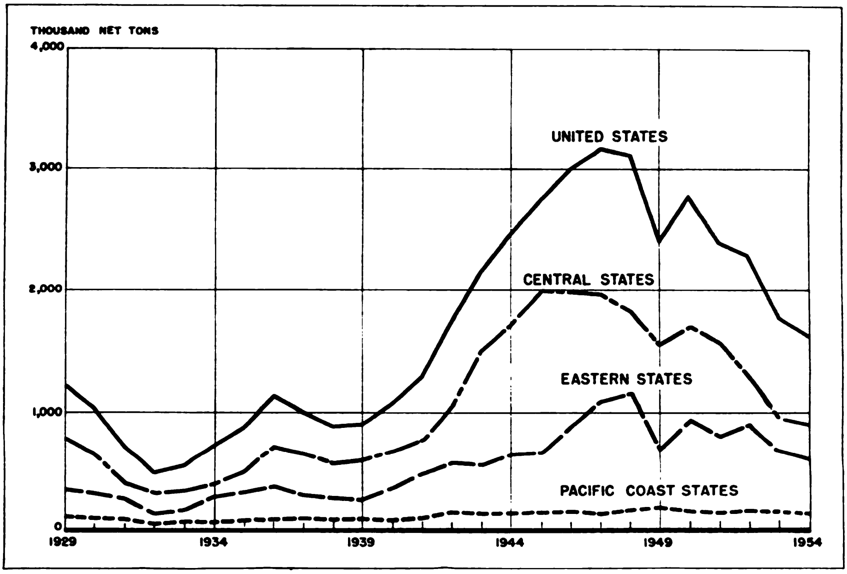

FIGURE 1.—Production of fuel briquets in the United States, 1929–54, by regions.

TABLE 1.—Salient statistics of the fuel-briquetting industry in the United States, 1947–49 (average) and 1951–54

	1947–49 (average)	1951	1952	1953	1954
Production:					
Eastern States net tons	971, 895	796, 359	886, 627	[1] 819, 153	[1] 723, 898
Central States do	1, 781, 575	1, 464, 185	1, 250, 365	960, 908	900, 564
Pacific Coast States do	147, 878	126, 675	142, 764	(2)	(2)
Total do	2, 901, 348	2, 387, 219	2, 279, 756	1, 780, 061	1, 624, 462
Value of production	$31, 805, 000	$27, 454, 638	$26, 743, 120	$21, 111, 293	$19, 161, 635
Average value per net ton, f. o. b. plant:					
Eastern States	$8. 93	$9. 79	$10. 00	$10. 04	$9. 71
Central States	$11. 84	$12. 31	$12. 79	$12. 91	$12. 92
Pacific Coast States	$13. 77	$12. 90	$13. 23	$13. 52	$13. 75
Imports [3] net tons	360	123	168	97	239
Exports [3] do	207, 928	168, 780	132, 786	102, 907	98, 908
Apparent consumption [4] do	2, 693, 780	2, 218, 562	2, 147, 138	1, 677, 251	1, 525, 793
World production do	62, 000, 000	[5] 103, 000, 000	[5] 112, 000, 000	[5] 118, 000, 000	117, 000, 000

[1] Includes Pacific Coast States.
[2] Combined with Eastern States to avoid disclosure of individual company figures.
[3] Compiled from records of U. S. Department of Commerce.
[4] Production plus imports minus exports.
[5] Revised figure.

TABLE 2.—Salient statistics of the packaged-fuel industry in the United States, 1947–49 (average) and 1951–54

	1947–49 (average)	1951	1952	1953	1954
Production:					
Eastern States net tons	1, 656	[1] 119, 535	[1] 96, 267	[1] 79, 732	[1] 77, 360
Central States do	153, 625				
Total do	155, 281	119, 535	96, 267	79, 732	77, 360
Value of production	$2, 618, 238	$2, 169, 539	$1, 780, 471	$1, 492, 119	$1, 416, 606
Average value per net ton f. o. b. plant:					
Eastern States	$17. 21	$18. 08	[1] $18. 50	[1] $18. 71	[1] $18. 31
Central States	$16. 86	$18. 15			

[1] Combined to avoid disclosure of individual company figures.

SCOPE OF REPORT

Except where otherwise noted, the statistics in this chapter are based on data voluntarily supplied to the Bureau of Mines by the manufacturers of fuel briquets and packaged fuel within the continental limits of the United States. Data on fuel briquets have been collected and published without interruption since 1907, when the Federal Geological Survey began an annual canvass of the industry. Statistics on packaged fuel, however, go back only to 1935. Briquets made from charcoal, wood scraps, and fruit pits are not included in the Bureau of Mines review. The production totals of fuel briquets and packaged fuel for 1954 will be compared with the Bureau of the Census totals for these commodities when they become available. Differences in the totals will be adjusted or explained in a subsequent release.

In 1954 questionnaires were sent to 33 fuel-briquet plants, and returns were received from 32. In the packaged-fuel industry 50 plants were canvassed, with replies from 44. In no instance was an attempt made to estimate for the nonreporting plants. For both fuel-briquet and packaged-fuel plants the companies that did not reply were small, operating intermittently in previous years, and were assumed to be idle in 1954.

The standard unit of measurement used in this report is the short or net ton of 2,000 pounds.

FUEL BRIQUETS

CAPACITY

The annual productive capacity of the fuel-briquet industry declined slightly during 1954 and at the end of the year totaled 4,161,000 tons. The slight drop (55,000 tons) in capacity was due largely to the closing of 1 plant, which reduced the number of active plants to 25, the smallest number active since 1930. This was the 11th fuel-briquet plant to discontinue operations since December 31, 1948. Virtually all of the plants that have gone out of production have had a designed capacity of less than 25,000 tons per year, and the number of plants with less than 25,000 tons' capacity dropped from 8 in 1948 to only 1 in 1954. However, the number of larger plants, or those with a designed annual capacity of 100,000 tons or more, has not changed during the same period. This trend has resulted in an increase in the average capacity of the industry from 130,000 tons per plant in 1948 to 166,000 tons in 1954.

The rate of operation of the larger plants is generally higher than in the smaller plants. The decline in demand for fuel briquets, however, in the past 5 years has caused the rate of production of all plants to decrease steadily. The 1954 production rate was the lowest since 1940 and was 23.2 points less than the 1950 rate and 3.2 points less than the rate in 1953 (table 3).

TABLE 3.—Annual capacity and production of briquetting plants in the United States, 1950–54

	Active plants	Annual capacity (net tons)	Production	
			Net tons	Percent of annual capacity
1950	31	4,455,000	2,770,020	62.2
1951	28	4,406,680	2,387,219	54.2
1952	28	4,442,500	2,279,756	51.3
1953	26	4,216,000	1,780,061	42.2
1954:				
Plants with capacity of—				
Less than 25,000 tons	1	[1] 425,000	[1] 155,430	36.6
25,000 to less than 100,000 tons	8			
100,000 to less than 200,000 tons	8	876,000	327,191	37.4
200,000 to less than 400,000 tons	5	1,360,000	513,830	37.8
400,000 or more tons	3	1,500,000	628,011	41.9
Total	25	4,161,000	1,624,462	39.0
Plants with production of—				
Less than 5,000 tons	3	[1] 225,000	[1] 20,864	9.3
5,000 to less than 10,000 tons	2			
10,000 to less than 25,000 tons	4	290,000	82,714	28.5
25,000 to less than 100,000 tons	10	1,236,000	452,732	36.6
100,000 or more tons	6	2,410,000	1,068,152	44.3
Total	25	4,161,000	1,624,462	39.0

[1] Combined to avoid disclosure of individual company figures.

PRODUCTION

Production of fuel briquets in 1954 decreased 9 percent from 1953 and was the lowest since 1941. Briquets are used principally for residential heating in the United States, and monthly output varies widely during the year. Production is higher during the winter and declines during the spring and summer. The principal centers of production are the low-volatile bituminous and anthracite mining areas and the area around the docks along the Great Lakes. Low-volatile bituminous coals contain high heat values but are generally quite friable and, when mined and transported, yield a large quantity of fines. The fines can be briquetted and make an excellent fuel for either hand firing or stoker use. Areas where considerable quantities of these fines constantly accumulate are at the docks in Wisconsin and the mining districts in southeastern West Virginia. The culm banks in the anthracite-mining region of Pennsylvania also provide raw material for briquetting. Plants in Wisconsin produced about one-third and West Virginia plants about one-fourth of the total United States output in 1954; these 2 States produced 64 percent of the national total. Missouri, using mostly low-volatile coals from West Virginia, ranked third in production, principally because of the St. Louis smoke-abatement ordinance. Other States that produced considerable quantities of briquets were Pennsylvania, Oregon, and Michigan.

TABLE 4.—Production and value of fuel briquets in the United States, 1953-54, by areas

Area [1]	1953			1954				
	Active plants	Production (net tons)	Value	Active plants	Production (net tons)	Value	Change from 1953 (percent)	
							Tonnage	Value
Eastern States	5	[2] 819,153	[2] $8,705,536	5	[2] 723,898	[2] $7,527,339	−11.6	−13.5
Central States	19	960,908	12,405,757	18	900,564	11,634,296	−6.3	−6.2
Pacific Coast States	2	([3])	([3])	2	([3])	([3])	([3])	([3])
Total	26	1,780,061	21,111,293	25	1,624,462	19,161,635	−8.7	−9.2

[1] Eastern States include Pennsylvania and West Virginia; Central States—Arkansas, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, and Wisconsin; Pacific Coast States—Oregon and Washington.

[2] Includes Pacific Coast States.

[3] Combined with Eastern States to avoid disclosure of individual company figures.

TABLE 5.—Production of fuel briquets in the United States in 1954, by months

Month	Net tons	Month	Net tons	Month	Net tons
January	226,947	May	62,587	September	171,368
February	113,491	June	90,224	October	212,598
March	82,028	July	79,266	November	215,402
April	50,875	August	105,876	December	213,800

Raw Fuels.—Briquets are produced from a wide variety of solid fuels, such as lignite char, bituminous coal, anthracite, semianthracite, petroleum coke, and residual carbon from the pyrolysis of oil. Low-volatile bituminous coal was the predominating raw material used in 1954 and represented 58 percent of the total raw fuels briquetted. West Virginia and Wisconsin are the leading States that utilize low-volatile bituminous coal; they converted 89 percent of the total into fuel briquets. Pennsylvania anthracite, which was the leading fuel used in manufacturing briquets during World War I, ranked second in 1954, and the quantity so used was 17 percent of the total. Petroleum coke was the only raw fuel for briquetting that increased substantially in use—from 73,366 tons in 1953 to 162,744 in 1954, or 122 percent. Most of this increase occurred in the Central States bordering the large petroleum-refining center of Chicago.

Residual carbon has been converted into briquets on the west coast for many years because of the large quantities available from the manufacture of oil gas; however, as only 1 plant in Washington and 1 in Oregon report use of residual carbon, the quantity used cannot be shown separately but is included with lignite char used by 1 plant in North Dakota.

Binders.—A number of binders can be used in manufacturing fuel briquets. The principal requisites for a satisfactory binder are (1) it must be inexpensive, (2) it must be substantially water insoluble and weather resistant, and (3) it must not significantly increase the ash content of the coal or reduce its heating value. Petroleum asphalt in general, meets all of these standards and is used almost exclusively by briquet plants in the United States. Two plants making briquets from residual carbon reported that no binding material was used. Of the plants using binders, only one plant used coal-tar pitch in addition to petroleum asphalt. It was estimated that 105,000 tons of petroleum asphalt was used for briquetting in 1954.

TABLE 6.—Raw fuels used in making fuel briquets in the United States in 1954

Type	Number of plants	Raw fuels used (net tons)	Source	Number of plants	Net tons		
					Yard screenings	Other raw fuels	Total
Anthracite:			Yard screenings	2	(1)	----------	(1)
Pennsylvania	12	260,639					
Other than Pennsylvania	1	[2] 27,908	Raw fuels (other than yard screenings)	17	--------	993,782	993,782
Semianthracite	3						
Bituminous coal:			Yard screenings and other raw fuels	6	225,402	299,743	525,145
Low-volatile	15	885,610					
High-volatile	3	40,078					
Petroleum coke	5	162,744					
Residual carbon from manufacture of oil gas	2	[2] 141,948					
Semicoke (lignite char)	1						
Total	[3] 25	1,518,927	Total	25	225,402	1,293,525	1,518,927

[1] Combined with "yard screenings and other raw fuels" to avoid disclosure of individual company figures.
[2] Combined to avoid disclosure of individual company figures.
[3] Some plants used more than 1 type of raw fuel, hence the sum of the plants exceeds the total shown.

TABLE 7.—Number of briquetting plants in the United States, 1950–54, by types of binder used

Type	1950	1951	1952	1953	1954
No binder [1]	2	2	2	2	2
Asphalt	28	26	26	23	22
Asphalt and coal-tar pitch	1	--------	--------	1	1
Total	31	28	28	26	25

[1] Residual carbon from manufacture of oil gas was used as raw fuel necessitating no binder.

SHIPMENTS

Fuel briquets were consumed in 35 States, the District of Columbia, Alaska, and 3 foreign countries in 1954. As it may be safely assumed that the fuel briquets are ultimately consumed in the States where shipments terminate, or the State of destination, the terms "distribution" and "consumption" are used synonymously in this chapter. As a rule, briquets are tough and strong, withstand handling and transportation, and can be shipped great distances. Wisconsin, the leading producing State, also led in consumption, and 16 percent of the total quantity distributed by the producing companies in 1954 was destined to briquet consumers in this State. Virtually all of the briquets consumed in Wisconsin were produced within the State, whereas less than 1 percent of the total produced was consumed within West Virginia, the second largest producing State. West Virginia shipped briquets to 16 other States and Canada, and 76 percent of the shipments went to Michigan, Indiana, Ohio, and Illinois. Although Missouri trailed West Virginia in production, it ranked second in consumption, principally because of the large quantities used in metropolitan St. Louis. Michigan ranked third in consumption and received 65 percent of its briquets from West Virginia. Other leading consuming States were Minnesota, Indiana, and Illinois, which together consumed 22 percent of the total distributed. Canada was the principal export market and received 8 percent of the total quantity shipped. Data collected by the Bureau of Mines on exports of briquets (table 8) differ from those compiled by the United States Department of Commerce, Bureau of the Census (table 10), because the Bureau of Mines includes briquets made from residual carbon and petroleum coke, whereas the Bureau of the Census excludes these data.

TABLE 8.—Destination of shipments of fuel briquets in 1953–54, in net tons

[Based upon reports from producers]

Destination	1953	1954	Destination	1953	1954
Arkansas	5,062	2,365	North Carolina	27,941	30,699
California	953	----------	North Dakota	59,430	61,831
Connecticut	2,263	1,740	Ohio	83,725	81,703
Delaware	222	----------	Oklahoma	362	139
District of Columbia	1,230	767	Oregon	38,244	37,599
Florida	160	306	Pennsylvania	15,639	12,806
Illinois	108,242	102,332	Rhode Island	593	796
Indiana	122,644	114,675	South Carolina	2,716	3,274
Iowa	48,277	41,868	South Dakota	59,849	56,092
Kansas	7,698	5,251	Tennessee	2,122	2,407
Kentucky	5,859	5,046	Texas	----------	79
Maine	4,289	4,853	Vermont	1,437	1,517
Maryland	11,904	9,301	Virginia	34,119	38,068
Massachusetts	16,020	10,319	Washington	17,214	17,318
Michigan	194,428	191,589	West Virginia	1,279	1,538
Minnesota	158,144	148,793	Wisconsin	280,020	262,235
Missouri	200,148	192,822			
Montana	----------	2	Total	1,560,877	1,466,839
Nebraska	15,165	8,878	Exported	207,618	159,789
New Hampshire	2,117	2,091			
New Jersey	22,432	7,801	Grand total	1,768,495	1,626,628
New York	8,930	7,939			

TABLE 9.—Shipments of fuel briquets in the United States, 1953–54, by methods of transportation, in net tons [1]

Origin	1953			1954		
	Rail	Truck [2]	Total	Rail	Truck [2]	Total
Eastern States [3]	750,647	72,348	822,995	652,749	70,601	723,350
Central States	620,108	325,392	945,500	567,892	335,386	903,278
Pacific Coast States	(4)	(4)	(4)	(4)	(4)	(4)
Total	1,370,755	397,740	[5] 1,768,495	1,220,641	405,987	[5] 1,626,628

[1] Includes shipments destined for export as reported by producers directly to Bureau of Mines.
[2] Includes quantities shipped by barge.
[3] Includes Pacific Coast States.
[4] Combined with Eastern States to avoid disclosure of individual company figures.
[5] An additional 260 tons was used by 2 producers as fuel at their plants in 1953 and 2,718 tons by 2 producers in 1954.

VALUE

The total sales value f. o. b. plants of the briquets manufactured in 1954 was $19 million, a 9-percent decrease from 1953. "Sales value," as reported by the producing companies, varies widely because of the different local conditions under which briquets are produced and sold. The principal factors influencing the value per ton realized at any plant are costs of raw materials, labor, and price of competing fuels.

In the Eastern States nearly all of the output comes from plants in the anthracite fields of eastern Pennsylvania and the bituminous low-volatile fields of southern West Virginia, where the cost of raw fuel does not involve freight charges. This region was the only one in which the reported average value in 1954 was less than in 1953. The average unit value in the Central States increased slightly in 1954. As 78 percent of the production in this region was reported by plants along the Great Lakes, the raw fuel for these plants involves a considerable freight charge, which is reflected in higher values per ton for briquets f. o. b. plant. In the Pacific Coast States (where the raw fuels used were residual carbon from the pyrolysis of oil gas) the average per ton represented the highest values f. o. b. plant in the United States.

TABLE 10.—Fuel briquets (coal and coke) exported from the United States, 1952–54, by countries of destination and customs districts

[U. S. Department of Commerce]

	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
Canada	132,751	$2,258,558	102,753	$1,674,367	96,221	$1,596,426
Cuba	30	2,131				
Dominican Republic	5	129				
Mexico					2,029	23,840
Total	132,786	2,260,818	102,753	1,674,367	98,250	1,620,266
South America:						
Bolivia			154	2,379		
Chile					658	6,266
Total			154	2,379	658	6,266
Grand total	132,786	2,260,818	102,907	1,676,746	98,908	1,626,532
CUSTOMS DISTRICT						
Buffalo	62,586	1,106,583	51,847	896,361	47,470	822,732
Dakota	25,050	327,619	19,714	232,891	18,919	243,355
Duluth and Superior	12,406	173,529	12,139	165,049	10,719	143,240
Laredo					169	2,100
Maine and New Hampshire	1,885	32,274	994	18,850	1,300	25,509
Maryland					658	6,266
Massachusetts					44	732
Michigan	2,731	30,353	3,814	49,709	1,718	23,247
Minnesota					45	593
New York	35	2,260				
Ohio			75	1,012		
St. Lawrence	27,995	587,148	13,820	306,255	15,366	328,188
Vermont	98	1,052				
Virginia			154	2,379		
Other [1]			350	4,240	2,500	30,570
Total	132,786	2,260,818	102,907	1,676,746	98,908	1,626,532

[1] Estimated from sample data; district data not available.

FOREIGN TRADE[1]

For many years imports of fuel briquets have been small and are insignificant in the fuel economy of the United States. In 1954 only 239 tons was imported from Canada. Export data on fuel briquets were reported separately for the first time by export classification number by the Department of Commerce in 1937 and include briquets made from coal and coke only. Briquets made from other raw materials, such as petroleum coke and residual carbon, are not included. Exports of briquets, as reported by the Department of Commerce, have averaged about 6 percent of production in recent years. Canada is the principal market for American briquets and received 97 percent of the total exported in 1954. The other 3 percent went to Mexico and Chile.

TECHNOLOGY

Little was published in 1954 relating to research on the briquetting of fuels in the United States. The Fourth Biennial Briquetting Conference was held at Estes Park, Colo., on September 1–3. Representatives of producers, equipment manufacturers, asphalt suppliers, and research organizations attended. Papers were presented from the United States, Canada, Mexico, and France. A résumé of the more important papers given at this conference will be published in the 1955 chapter.

The Central Research Establishment of the National Coal Board of Great Britain announced development of a method of briquetting coal between 250° and 450° C. by using a compound binder.[2] This compound binder is a mixture of coal and a substance that becomes plastic at a lower temperature than the coal itself. This could be a coal tar or a coal-tar byproduct, such as pitch, or it could be a petroleum bitumen or other byproduct of petroleum, or tar and oils recovered from the distillation of wood. The amount of binder required and the initial strength of the briquets are governed chiefly by the composition of the compound binder and by the rank of coal used in it.

Much research and many worthwhile developments over the years in the fuel-briquetting field have emanated from Germany. A great deal of this work has been centered around the economic utilization of brown coal, which is quite plentiful in that country. A development that may promote the utilization of German brown coal and could be used in other countries that do not have coking coal, is the process for reducing iron ore developed by the Klockner-Humboldt-Duetz A. G. at Humboldt, Germany.[3] In this process fine ore and noncoking coal are ground, mixed with binders, and briquetted. Tar pitch, asphalt, and sulfite tars have been used as binder materials. Ore, coal, and limestone are mixed with 6-percent tar and briquetted at about 3,500 p. s. i.

In 1954 the Anthracite Equipment Corp., a wholly owned subsidiary of Anthracite Institute, Wilkes-Barre, Pa., placed on the market a new type of packaged fuel for grilling, broiling, and barbecuing.[4] These briquets are made from anthracite fines, and are marketed in 2-pound packages. They are intended to be used without removal from the box, and no kindling or other starter fuel is required.

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[1] Figures on imports and exports compiled by Mae B. Price and Elsie D. Page, Division of Foreign Activities, Bureau of Mines, from records of the U. S. Department of Commerce.

[2] Coke and Gas, Compound Binder for Briquetting Coal: Vol. 16, No. 186, November 1954, pp. 459–460.

[3] Killing, Erick, New Experience with Iron-Ore Reduction in Low-Shaft Blast Furnace: Stahl u. Eisen, vol. 72, July 1953, pp. 925–928; abs. in Met. Prog., vol. 64, No. 6, December 1953, pp. 180–188.

PACKAGED FUEL

CAPACITY

The annual capacity of the packaged-fuel industry of the United States increased slightly in 1954 and totaled 243,300 tons. There were 37 active plants, the same number as in 1953. Packaged-fuel plants generally are small, as indicated in table 11, which shows that 25 plants had an annual capacity of less than 5,000 tons. The smaller plants were affected to a greater extent by the declining market for packaged fuel; as a result, the rate of production was lower than for the larger plants. The rate of production for the industry as a whole averaged 31.8 percent of capacity, or 2.4 points less than in 1953. The 4 largest plants, which produced about two-thirds of the total output, operated at 42.2 percent of capacity.

TABLE 11.—Annual capacity and production of packaged-fuel plants in the United States, 1950–54

	Active plants	Annual capacity (net tons)	Production	
			Net tons	Percent of annual capacity
1950	54	293, 560	135, 682	46. 2
1951	53	277, 010	119, 535	43. 2
1952	43	358, 858	96, 267	26. 8
1953	37	232, 850	79, 732	34. 2
1954:				
Plants with capacity of—				
Less than 5,000 tons	25	63, 700	13, 744	21. 6
5,000 to less than 10,000 tons	6	38, 800	10, 331	26. 6
10,000 to less than 15,000 tons	3	32, 800	8, 578	26. 2
15,000 to less than 25,000 tons	1	[1] 108, 000	[1] 44, 707	41. 4
25,000 or more tons	2			
Total	37	243, 300	77, 360	31. 8
Plants with production of—				
Less than 1,000 tons	22	56, 200	9, 619	17. 1
1,000 to less than 3,000 tons	11	68, 300	17, 663	25. 9
3,000 to less than 5,000 tons	-----	-----	-----	-----
5,000 to less than 10,000 tons	2	[1] 118, 800	[1] 50, 078	42. 2
10,000 or more tons	2			
Total	37	243, 300	77, 360	31. 8

[1] Combined to avoid disclosure of individual company figures.

PRODUCTION

Production of packaged fuel fell 3 percent in 1954, as demand continued to decline. Except for a slight increase in production in Michigan and Virginia, output in the other producing States decreased 2 to 45 percent. Michigan, as usual, was the largest producer of packaged fuel, with 44 percent of the national output, followed by Ohio, Wisconsin, and Indiana. These 4 States produced 91 percent of the total. As packaged fuel is used exclusively for space heating, production is highly seasonal, and operations during the summer are quite low. Monthly output ranged from 279 tons in July to 11,772 tons in December.

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[4] Coal Age, Anthracite Packaged as Grill Briquets: Vol. 59, No. 6, June 1954, p. 142.

TABLE 12.—Production and value of packaged fuel in the United States, 1953–54, by States

State	1953			1954				
	Active plants	Production (net tons)	Value	Active plants	Production (net tons)	Value	Change from 1953 (percent)	
							Tonnage	Value
Indiana	3	10,567	$211,200	3	10,081	$201,580	−4.6	−4.6
Michigan	12	33,483	577,362	11	34,060	559,900	+1.7	−3.0
Minnesota	3	4,715	113,735	3	4,221	102,564	−10.5	−9.8
Ohio	11	13,885	272,850	12	13,567	258,786	−2.3	−5.2
Wisconsin	3	13,701	245,397	3	12,767	236,546	−6.8	−3.6
Other States [1]	5	3,381	71,575	5	2,664	57,230	−21.2	−20.0
Total	37	79,732	1,492,119	37	77,360	1,416,606	−3.0	−5.1

[1] Comprises 2 plants in Illinois and 1 plant each in Iowa, Nebraska, and Virginia.

TABLE 13.—Production of packaged fuel in the United States in 1954, by months

Month	Net tons	Month	Net tons	Month	Net tons
January	11,605	May	4,118	September	4,529
February	8,831	June	699	October	8,327
March	10,131	July	279	November	10,825
April	4,696	August	1,548	December	11,772

Raw Fuels.—Low-volatile bituminous coal was the principal raw fuel used in the manufacture of packaged fuel in 1954. Small quantities of high-volatile bituminous coal, semianthracite, and petroleum coke were also used, but the quantity of these raw fuels amounted to only 7 percent of the total. Low-volatile coals have a high calorific value and burn with little smoke, but they are quite friable. This results in a large amount of fines in mining and shipping. For this reason, retail fuel dealers, wherever it is economical and markets exist, make packaged fuel from this fine material. Although nearly two-thirds of the plants used only yard screenings, the total raw material from this source is much smaller than the quantity obtained as screened slack direct from mines or from fines accumulated at loading and unloading terminals.

Binders.—Starches, in the form of corn or wheat flour, are the preferred binding materials for the manufacture of packaged fuel. In 1954 all of the plants used starches except one, which used petroleum asphalt. Starch is preferred because it makes a stronger cube or block than asphalt or pitch and does not add any ash or volatile matter to the product. Petroleum asphalt and coal-tar pitch do not add any ash but tend to make the packaged fuel smoky. The quantity of starch added to the raw fuel varied from 10 to 20 pounds per ton of coal and averaged 13 pounds for the industry. It was estimated that about 422 tons of starch was used in manufacturing packaged fuel in 1954.

TABLE 14.—Raw fuels used in making packaged fuel in the United States in 1954

Type	Number of plants	Raw fuels used (net tons)	Source	Number of plants	Net tons: Yard screenings	Net tons: Other raw fuels	Net tons: Total
Bituminous coal:			Yard screenings	22	17,509		17,509
Low-volatile	33	71,021	Raw fuels (other than yard screenings)	9		41,106	41,106
High-volatile	1	[1] 3,300					
Semianthracite	2		Yard screenings and other raw fuels	6	2,414	15,077	17,491
Petroleum coke	4	1,785					
Total	[2] 37	76,106	Total	37	19,923	56,183	76,106

[1] Combined to avoid disclosure of individual company figures.
[2] Some plants used more than 1 type of raw fuel, hence the sum of the plants exceeds the total shown.

TABLE 15.—Number of packaged-fuel plants in the United States, 1950–54, by types of binder used

Type	1950	1951	1952	1953	1954
Starch	48	48	39	36	36
Asphalt	2	2	1	1	1
Starch and asphalt	1		1		
Cement	2	2	2		
Starch and cement		1			
Coal-tar pitch	1				
Total	54	53	43	37	37

SHIPMENTS

Packaged fuel is generally used locally and is not transported long distances. For the first time on record, there were no shipments by rail in 1954. A large part of the tonnage, specified as shipped by truck, was not actually loaded on trucks but was picked up by the ultimate consumers in their cars. The trend toward self-service in many fields of merchandising has also been adopted by some packaged-fuel manufacturers, and some producers have installed vending machines. It is claimed that vending machines reduce labor costs and permit the sale of packaged fuel in the evenings and at night.

VALUE

The total sales value, f. o. b. plants, of packaged fuel manufactured in 1954 decreased 5 percent from 1953 and was $1,416,606. The average sales value per ton decreased for the first time since 1940 but was still above the 1951 figure. The average value shown for packaged fuel is much higher than for fuel briquets because of higher manufacturing costs, as well as different marketing procedures. Most of the packaged-fuel production is retailed by the producing companies in small lots, and the value includes cost of raw materials and manufacturing as well as a margin of profit.

TABLE 16.—Shipments of packaged fuel in the United States, 1950–54, by methods of transportation, in net tons

Year	Shipped by truck			Shipped by rail	Total
	Local sales	Other than local sales	Total		
1950	112.962	13,774	126.736	7,814	134,550
1951	98.324	13.566	111.890	7,950	119,840
1952	76,874	9.698	86.572	6,864	93,436
1953	68.275	8,254	76.529	3,582	80,111
1954	78.464		78,464		78,464

WORLD REVIEW[5]

World production of processed fuels (fuel briquets and packaged fuel) in 1954 was estimated at 117 million tons, a decline of 1 million tons from the record output of 1953. There was little change in the pattern of production established in prior years, and European countries continued to produce 95 percent of the world total. Fuel briquetting has developed faster in Europe than in other parts of the world because a large proportion of the coal supplies are of low grade, which, in their raw state, cannot be utilized economically. Briquetting of brown coal in Germany is a good example of how an inferior raw fuel can be improved. Briquetting of brown coal has been done on a large scale for many years, and the briquets have been used as railroad fuel, for electric power generation, and for residential heating and cooking. Much of the brown-coal reserves are in the central and eastern parts of Germany, and this accounts for the large amount of briquets that have always been produced in eastern Germany. Although the output of briquets in East Germany declined slightly in 1954, production has increased faster in this area than in any other part of the world, rising 43 percent in the past 5 years. Production of both hard-coal briquets and those made from brown coal have increased substantially in West Germany. Production of briquets in both zones of Germany amounted to over 72 percent of the world total. It was estimated that the Soviet Republic produced about 9,400,000 tons of briquets in 1954, which would place that country second to Germany in world production. In France production slipped a little in 1954 but was still over 7 million tons. These 3 countries produced 87 percent of the world output. The only other country that produced over 2 million tons was Japan, where fuel briquets are used for railroad fuel as well as for domestic heating and cooking. Other countries that produced over 1 million tons were: United Kingdom, United States, Belgium, Spain, and Netherlands.

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[5] Figures on world production compiled by Pauline Roberts, of the Foreign Statistics Unit, Division of Foreign Activities, Bureau of Mines.

TABLE 17.—World production of fuel briquets and packaged fuel, 1950–54, by countries, in thousand net tons [1]

Country	1950	1951	1952	1953	1954
North America:					
Canada	452	396	711	708	831
United States:					
Briquets	2,770	2,387	2,280	1,780	1,624
Packaged fuel	136	120	96	80	77
Total	3,358	2,903	3,087	2,568	2,532
Europe:					
Austria	51	88	55	19	9
Belgium	1,124	1,995	1,635	1,458	1,519
Bulgaria [2]	220	220	250	250	250
Czechoslovakia: [2]					
Bituminous	430	435	440	440	450
Lignite	335	440	470	470	495
Denmark [3]	[2] 45	56	97	86	[2] 95
Finland (capacity)	88	[2] 88	[2] 88	[2] 88	[2] 88
France	6,958	8,900	8,753	7,697	7,416
Germany:					
East, lignite	[2] 42,000	[2] 48,100	[2] 56,100	62,080	[2] 60,000
West:					
Bituminous	4,492	4,876	5,906	5,783	6,647
Lignite	16,438	17,553	18,081	18,275	18,372
Hungary [2]	140	165	175	195	220
Ireland [3]	31	30	35	42	35
Italy, anthracite	2	(4)	----------	----------	24
Netherlands:					
Bituminous	1,156	1,171	1,041	996	1,012
Lignite	63	80	80	93	90
Poland:					
Bituminous	696	[2] 685	[2] 700	[2] 700	[2] 700
Lignite	186	[2] 175	[2] 180	[2] 185	[2] 195
Portugal	87	100	104	91	[2] 95
Rumania [2]	275	275	285	285	285
Spain	1,246	1,280	1,265	1,283	1,230
Sweden [3]	49	120	84	[2] 60	67
Switzerland [2]	110	110	110	110	110
U. S. S. R. [2] [3]	7,000	8,000	8,000	9,300	9,400
United Kingdom	1,564	1,957	1,990	1,765	1,884
Yugoslavia:					
Bituminous	[2] 220	24	18	[2] 18	[2] 22
Lignite		[2] 195	[2] 195	[2] 195	[2] 200
Total [2]	85,000	97,000	106,000	112,000	111,000
Asia:					
Indochina	37	46	77	51	55
Indonesia	28	30	42	37	3
Japan	1,326	1,801	1,882	2,281	2,724
Korea, Republic of	41	30	52	64	80
Pakistan [2]	8	9	11	13	13
Turkey	32	33	41	88	99
Total	1,470	1,950	2,105	2,535	2,975
Africa:					
Algeria	73	74	57	45	32
French Morocco	39	28	18	20	17
Tunisia	47	42	17	15	[2] 15
Total	159	144	92	80	[2] 65
Oceania:					
Australia	[5] 659	[5] 573	627	627	688
New Zealand	12	12	12	13	[2] 13
Total	671	585	639	640	[2] 700
World total (estimate)	91,000	103,000	112,000	118,000	117,000

[1] Includes revisions of data published previously.
[2] Estimate.
[3] Includes peat briquets.
[4] Negligible.
Year ended June 30 of year stated.

Peat

By Eugene T. Sheridan and Maxine M. Otero

◆

GENERAL SUMMARY

PRODUCTION of peat in the United States in 1954 was 19 percent higher than in 1953 and almost double the 1947–49 average; it reached a new high of 243,257 net tons, valued at $2,248,532. Imports increased also in 1954 and were 21 percent higher than in 1953. These substantial increases were due chiefly to expanding markets in the agricultural and horticultural fields. Peat is used as fuel in many European countries but is not so employed in the United States. In this country peat is principally a soil conditioner for lawns, gardens, golf courses, nurseries, and greenhouses and a filler in mixed fertilizers. It is also used as litter for barns and poultry yards and as packing material for plants, cut flowers, and certain vegetables.

The consumption of peat has increased greatly in the past 5 years and in 1954 was more than double the average consumption in 1947–49. During this period domestic production increased 85 percent; however, production of peat was not able to pace demand, and imports also increased greatly. Imports almost equaled domestic production in 1954. Most imported peat comes from West Germany and Canada.

TABLE 1.—Salient statistics of the peat industry in the United States, 1947–49 (average) and 1951–54

	1947–49 (average)	1951	1952	1953	1954
Production……net tons	131,782	194,416	210,582	204,209	[1] 243,257
Imports……do	88,462	144,390	167,404	199,887	240,940
Apparent consumption……do	220,244	338,806	377,986	404,096	484,197
Value of production……	$939,518	$1,489,225	$1,729,511	$1,617,947	$2,248,532
Average per net ton……	$7.13	$7.66	$8.21	$7.92	$9.24
World production……net tons	50,000,000	[2] 60,000,000	60,000,000	[2] 59,000,000	59,000,000

[1] Includes small tonnages with values under $500 which are not included by the Bureau of the Census. Approximately 55 percent of the production increase over 1953 is attributed to producers that had not reported before 1954.

[2] Revised figure.

GOVERNMENT REGULATIONS

Since the physical and chemical properties of peat are so varied, no national standards have as yet been established for grading the various types. Peat is frequently sold in bulk, and 1 cubic yard ranges from 700 to 1,200 pounds in weight and from 30 to 70 percent in moisture content. Naturally, the organic-matter content of 1 cubic yard of peat will vary greatly, depending upon the moisture content. In January 1950, however, the Federal Trade Commission established trade-practice rules for the peat industry. These were designed to maintain free and fair competition in the industry and to eliminate and prevent deceptive practices in the sale of industry products. Practices deemed to be unfair are defined, and guidance is given as to the proper use of significant terms in marketing products. In addition, some State governments specify standards for peat that they purchase, and all peat procured by the Federal Government must conform to specifications defined in the Federal Stock Catalog (section IV, part 5) Q–P166–3 (November 1947).

A duty of $0.25 per ton is levied on all imported peat moss classified as poultry and stable grade; however, peat moss imported for agricultural purposes is duty free.

SCOPE OF REPORT

The Bureau of Mines compiled the statistical data presented in this chapter from producers' reports, collected jointly by the Bureau of Mines, United States Department of the Interior, and the Bureau of the Census, United States Department of Commerce, for 1954. Complete coverage of the industry was attempted, but undoubtedly there are some small operators who failed to submit reports. No attempt was made to estimate for these operations; however, the reports actually received probably represent almost complete coverage of commercial producers.

Eighty-five companies, in 21 States, submitted reports for 1954. These reports requested the name and location of the operation, production figures by types, sales by uses, and total selling price or value at the plant, by types and by uses. No information is collected on stocks, as producers do not normally stock peat.

The production figures have not been adjusted for moisture and are on an air-dried basis only. Although peat is usually sold in bulk by cubic yard or by bale, the unit of measurement in this chapter is the net (short) ton of 2,000 pounds.

The 3-year period 1947–49 is used as a base for measuring production and consumption trends.

RESERVES

The United States has extensive reserves of peat. Peat and muck lands total about 79 million acres[1] and contain about 13.8 billion net tons. The northern region, which includes New England, the Middle Atlantic States, and those bordering the Great Lakes, as well as Iowa, contains 80 percent of the total deposits. Minnesota alone has 49 percent of the reserves, and Wisconsin and Michigan together have 25 percent. The Atlantic coastal region contains 20 percent of the total peat reserves, of which Florida has 14 percent. The Pacific Coast and Gulf States contain less than 1 percent of the total reserves.

The chemical and physical properties of peat vary greatly, depending upon the kinds of plants from which it was formed, on their degree of decomposition, and on climatic conditions in the area. The most extensive deposits in the United States are of the sphagnum or moss-peat type. This type is formed from the remains of mosses, grasses, sedges, heath shrubs, and trees and is usually fibrous, elastic, and light in color. Moss peat abounds in northern Minnesota, Wisconsin, Michigan, and New England. Most of the peat found in other States of the northern region are similar in texture but are usually more fibrous. All the moss-type peats normally have a strongly acid reaction. Reed and sedge peat is formed from reeds, sedges, cattails, and other swamp plants and is found principally in shallow areas near lakes and ponds and in swampy meadows. It is also formed in the salt marshes along the New England coast. The peat of the Atlantic coastal region was formed mainly from material derived from the roots, trunks, and branches of trees and shrubs, which became mixed with the remains of leaves, ferns, and rootlets. At least half of the peat deposits in Florida are in the Everglades, and this peat is composed largely of the remains of a sedge called sawgrass.

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[1] Anderson, M. S., Blake, S. F., and Mehring, A. L., Peat and Muck in Agriculture: U. S. Dept. of Agriculture Cir. 888, October 1951. 31 pp.

TABLE 2.—Known original reserves of peat in the United States, estimated on an air-dried basis, by regions and States, in thousand net tons [1]

Region and State	Reserves	Region and State	Reserves
Northern region:		Atlantic coastal region:	
Minnesota	6,835,000	Virginia and North Carolina	700,000
Wisconsin	2,500,000	Florida	2,000,000
Michigan	1,000,000	Other States [2]	2,000
Iowa	22,000		
Illinois	10,000	Total	2,702,000
Indiana	13,000	Other regions:	
Ohio	50,000	Gulf coast [3]	2,000
Pennsylvania	1,000	California	72,000
New York	480,000	Oregon and Washington	1,000
New Jersey	15,000		
Maine	100,000	Total	75,000
New Hampshire	1,000		
Vermont	8,000		
Massachusetts	12,000		
Connecticut	2,000		
Rhode Island	1,000		
Total	11,050,000	Total all regions	13,827,000

[1] Geological Survey, Coal Resources of the United States (Progress Report): Circ. 293, Oct. 1, 1953, p. 38.
[2] Includes Delaware, Maryland, South Carolina, and Georgia.
[3] Exclusive of Florida.

PRODUCTION

Eighty-five companies in 21 States reported commercial production of peat in 1954; this was 17 more than in 1953. Washington produced the greatest amount of peat in 1954, supplying about 20 percent of the total production, and Florida was second with 15 percent. Production in Washington and in Florida was about one-third greater than in 1953.

Sixty percent of the peat produced was reported as peat humus. Reed or sedge composed 27 percent; peat moss, 11 percent; and "other types", 2 percent. In 1953 peat humus composed 54 percent of the total production; reed or sedge, 37 percent; and moss peat (including that listed as other types), 9 percent. About 85 percent of the peat produced was prepared for use by screening, shredding, pulverizing, or other processing.

TABLE 3.—Peat produced in the United States, 1952–54, by States

State	1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value
California, Colorado, and Idaho	12,839	$96,936	15,263	$126,985	17,618	$194.453
Florida	23,729	154,164	27,678	185,524	37,449	168,004
Georgia and Texas	3,350	50,000	3,680	54,560	6,550	74,920
Illinois, Indiana, and Iowa	29,533	216,666	26,303	198,786	33,457	362,149
Michigan, Minnesota, and Wisconsin	30,053	423,747	25,805	259,026	28,797	438,016
New England	12,366	124,051	11,964	119,976	8,918	130,369
New Jersey and New York	23,406	218,023	25,481	260,826	22,173	229,241
Ohio	24,828	290,664	27,696	260,474	29,540	356,970
Pennsylvania	7,898	43,874	8,232	47,516	15,621	141,352
Washington	42,580	111,386	32,107	104,274	43,134	153,058
Total	210,582	1,729,511	204,209	1,617,947	[1] 243,257	2,248,532

[1] See table 1, footnote 1.

TABLE 4.—Peat produced in the United States, 1953–54, by kinds

Kind	1953			1954		
	Net tons	Value		Net tons	Value	
		Total	Average		Total	Average
Moss	[1] 18,595	[1] $220,741	$11.87	27,293	$316,641	$11.60
Reed or sedge	74,708	659,188	8.82	64,459	862,531	13.38
Humus	110,906	738,018	6.65	146,544	1,056,421	7.21
Other types	(2)	(2)	(2)	4,961	12,939	2.61
Total	204,209	1,617,947	7.92	[3] 243,257	2,248,532	9.24

[1] Includes "Other types" of peat reported by 2 producers.
[2] Included with "moss" peat.
[3] See table 1, footnote 1.

CONSUMPTION AND USES

As in previous years, most of the peat produced in the United States was used for soil improvement. Peat used for this purpose represented 83 percent of the total quantity sold in 1954. The amount sold for soil improvement was 35 percent more than in 1953 and 46 percent more than in 1951. Peat is not a natural fertilizer but is used principally as a soil conditioner. Although some peats contain a relatively high percentage of nitrogen, it is not readily released as plant food like the "soluble nitrogen" of artificial fertilizers. Peat, however, tends to improve the physical condition of heavy-textured soils and improves their moisture-holding qualities. Sphagnum peat is especially effective for retaining water in soils.

Peat is also used as a filler and conditioner in the manufacture of mixed fertilizers. Some fertilizer materials are hygroscopic; and, to reduce stickiness and caking, dry finely-ground peat is added. The peat will absorb from the fertilizer particles some of the moisture normally absorbed from the air. It also acts as a makeweight material to fill out the fertilizer formula. Approximately 15 percent of the total amount of peat sold in 1954 went into the manufacture of fertilizers. Approximately 20 percent of the total amount sold from 1951 through 1953 was used for this purpose.

Because of its moisture-absorbing qualities and deodorizing capacity, peat is employed as litter material for poultry and as bedding for horses and cattle. A small amount is also used for packing plants, cut flowers, eggs, and other fragile materials for shipment. Some peat is used for filtering purposes, but the quantities consumed are small, and accurate figures are not available.

TABLE 5.—Peat sold in the United States, 1951–54, by uses

Use	1951		1952		1953		1954	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Soil improvement	138, 712	$962, 002	159, 203	$1,189.195	149, 964	$1,103,260	202, 280	$1, 756, 206
Mixed fertilizers	37, 233	364, 164	37, 957	401, 180	37, 997	413, 939	36, 916	366, 658
Other uses	14, 800	141, 268	9, 159	80, 060	10, 884	141, 217	3, 660	129, 880
Total	190, 745	1, 467, 434	206, 319	1, 670, 435	198, 845	1, 658, 416	[1] 242, 856	2, 252, 744

[1] See table 1, footnote 1.

VALUE AND PRICE

The average values of peat produced and sold are based upon producers' selling prices at the plant. Reed and sedge peats had the highest average value per ton, moss peat ranked second, and humus was third. The average value for reed and sedge peat in 1954 was $4.56 per ton, or 52 percent higher than in 1953. Moss peat declined $1.65 per ton or 14 percent, while humus increased $0.56 per ton or 8 percent.

The average selling price in the United States for peat of all types in 1954 was $9.28 per ton. This was 11 percent higher than the $8.34 per ton in 1953. Peat sold for use as a soil conditioner brought the lowest price per ton, and peat sold for "other uses" brought the highest. Some of the peat listed as sold for "other uses" was marketed in small packages for household plants and averaged as much as $50.00 per ton. This, of course, influenced the average for this group.

TABLE 6.—Average value per ton of peat produced, by types, and sold, by uses, 1947–49 (average) and 1951–54

Year	Average value per ton produced			Average value per ton sold		
	Moss [1]	Reed and sedge	Humus	Soil improvement	Mixed fertilizers	Other uses
1947–49 (average)	$12. 20	$7. 64	$6. 86	$6. 33	$9. 13	$7. 43
1951	5. 87	9. 93	7. 15	6. 94	9. 78	9. 55
1952	10. 38	9. 92	7. 15	7. 47	10. 57	8. 74
1953	11. 87	8. 82	6. 65	7. 36	10. 89	12. 97
1954	10. 22	13. 38	7. 21	8. 68	9. 93	35. 49

[1] Includes value of "Other types" of peat.

FOREIGN TRADE [3]

Peat imports in 1954 were 21 percent greater than in 1953 and about equaled domestic production; however, the value of imported peat was almost 4 times greater than domestic peat. The United States

TABLE 7.—Peat moss imported for consumption in the United States, 1952–54, by kinds and by countries

[U. S. Department of Commerce]

County	Poultry and stable grade		Fertilizer grade		Total	
	Net tons	Value	Net tons	Value	Net tons	Value
	1952					
North America: Canada	11,967	$664,467	54,676	$2,504.359	66,643	$3,168.826
Europe:						
Denmark			140	3,987	140	3,987
France			5	142	5	142
Germany:						
East			85	1.680	85	1,680
West	9,815	341,015	81.626	2,657 072	91,441	2,998,087
Ireland	78	3,010	1,165	48,040	1,243	51,050
Netherlands	325	20,458	7,365	253,563	7,690	274,021
United Kingdom			157	4,659	157	4,659
Total	10,218	364,483	90,543	2,969,143	100,761	3,333,626
Grand total	22,185	1,028,950	145,219	5,473,502	167.404	6,502,452
	1953					
North America:						
Canada	8,490	487,040	61,669	2,716.835	70,159	3,203,875
Mexico	3	125	57	2,966	60	3,091
Total	8,493	487,165	61,726	2,719,801	70,219	3,206,966
Europe:						
Belgium-Luxembourg			(1)	12	(1)	12
Denmark			9	489	9	489
France			4	188	4	188
Germany, West	9,965	343,482	106,922	3,361,039	116.887	3,704,521
Ireland	45	1,407	1,965	79.338	2,010	80,745
Netherlands	388	12,775	10,286	325,090	10,674	337,865
United Kingdom			84	2,963	84	2.963
Total	10,398	357,664	119,270	3,769,119	129,668	4,126,783
Grand total	18,891	844,829	180,996	6,488,920	199,887	7,333,749
	1954					
North America: Canada	10,321	623,895	80,028	3,739,524	90,349	4,363,419
Europe:						
Germany, West	9,640	294,130	130,956	3,830,626	140,596	4,124,756
Ireland			865	29,350	865	29,350
Netherlands	211	7,341	8,712	305.428	8,923	312,769
Sweden			70	1,536	70	1,536
United Kingdom			137	4,495	137	4,495
Total	9,851	301,471	140.740	4,171,435	150,591	4,472,906
Grand total	20,172	[2] 925,366	220,768	[2] 7,910,959	240,940	[2] 8,836,325

[1] Less than 1 ton.

[2] Due to changes in tabulating procedures by the U. S. Department of Commerce, data known not to be strictly comparable to those for earlier years.

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[3] Figures on imports compiled by Mae B. Price and Elsie D. Page, of the Division of Foreign Activities Bureau of Mines, from records of the U. S. Department of Commerce.

Department of Commerce classifies imported peat into two grades, (1) poultry and stable and (2) fertilizer. Most imported peat was "fertilizer grade", and in 1954 only 8 percent was "poultry and stable grade." Peat from West Germany constituted 58 percent of total imports, and Canada supplied 37 percent. German imports were one-fifth greater and Canadian imports one-third greater than in 1953. A small amount came from the Netherlands and insignificant amounts from Ireland, Sweden, and the United Kingdom. Imported peat is almost entirely of the moss-peat type.

TECHNOLOGY

Technological progress is greatest in those countries that are forced to use peat for fuel. For many years peat has been effectively and economically burned for steam raising in some foreign countries. The use of peat in boiler furnaces is successfully carried out in U. S. S. R., where, it is claimed, peat fuel is used to generate 30 percent of all electric energy. In U. S. S. R., Ireland, Sweden, and Germany the use of peat as a fuel has progressed from small, hand-fired furnaces using machine peat to present-day automatic furnaces using finely ground milled peat as a pulverized fuel.

The carbonization of peat to recover char, tar, and other byproducts has been studied in many countries, particularly in Ireland, Sweden, and Germany. Germany did extensive research during World War II on low-temperature carbonization of peat, and Sweden has been carrying on experiments during the past few years on this phase of peat utilization. Phenols may be extracted from peat tars, and the demand for phenols could place peat in a favorable position as a source of raw material for the phenol-aldehyde plastics.

At the International Peat Symposium in Dublin, Ireland, in 1954, G. C. Ackroyd of the British Fuel Research Station reported that recent studies of peat wax in Britain now suggest interesting possibilities for a greater chemical utilization of this relatively abundant raw material. He stated that peat wax is a complex mixture of organic compounds of high molecular weight, and their molecular structure suggests potential chemical uses, possibly the production of plastics. D. MacDougall, also of Britain's Fuel Research Station, reported on other studies of the use of peat for gasification. Milled peat, consisting of sphagnum, cotton grass, and heather mixture, was dried to 16 percent moisture and fed with a stream of superheated steam into a gasification chamber operating at 800° C. In this process a type of gas similar to that obtained from low-grade coal was made.[3]

WORLD REVIEW [4]

The estimated world production of peat in 1954 remained the same as in 1953, with a total of 59 million tons. Production in all countries was essentially the same, except that production increased 19 percent in the United States and decreased 5 percent in Denmark. Production varied slightly in several other countries, but the amounts produced were insignificant.

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[3] Chemical and Engineering News, Wax from the Bogs: Vol. 32, No. 33, Aug. 16, 1954, p. 3271.

[4] Figures on world production compiled by Pauline Roberts of the Foreign Statistics Unit, Division of Foreign Activities, Bureau of Mines.

The U. S. S. R. produced approximately 50 million tons or 85 percent of the estimated world total. Large quantities are used in U. S. S. R. generating electric power. Ireland, the Netherlands, Germany, and Denmark together produced about 7½ million tons or 13 percent, and the remaining peat-producing areas of the world produced only 2 percent of the total.

Most of the peat produced is used for fuel purposes. Only Canada, Sweden, West Germany, and the United States use significant amounts for agricultural purposes, but these are negligible compared with total world production.

Much peat is used in Europe as a household fuel. It is also burned effectively and economically for steam raising and for central heating in foreign countries. As stated previously under Technology, Ireland, Sweden, and U. S. S. R. have made notable advances in the use of peat for firing steam boilers, and several power plants in these countries use peat for fuel.

TABLE 8.—World production of peat, by countries, 1950–54, in thousand net tons [1]

Country	1950	1951	1952	1953	1954
Austria [2]	55	55	55	55	55
Canada, agricultural use [3]	75	77	75	82	87
Denmark	994	2,220	1,792	633	600
Finland:					
Agricultural use	8	8	[2] 220	4	[2] 6
Fuel	217	220		216	[2] 220
France, fuel	11	[2] 22	[2] 17	[2] 17	[2] 22
Germany:					
East [2]	550	550	550	550	550
West:					
Agricultural use	[2] 1,300	308	371	485	480
Fuel		1,264	897	992	1,041
Hungary [2]	9	9	55	55	60
Iceland [2]	3	2	3	1	(4)
Ireland:					
Agricultural use	3,433	3	4	6	6
Fuel		4,397	4,255	4,226	4,254
Italy	4	6	1	1	[2] 1
Japan	(4)	(4)	33	55	[2] 65
Korea, Republic of	[2] 220	352	89	83	[2] 110
Netherlands	582	708	766	499	[2] 500
Norway:					
Agricultural use	28	28	29	23	23
Fuel	398	362	366	279	261
Spain	6	4	2	1	[2] 1
Sweden:					
Agricultural use	109	114	100	[2] 100	[2] 110
Fuel	195	269	288	[2] 275	[2] 275
U. S. S. R. [2]	49,000	49,000	50,000	50,000	50,000
United States, agricultural use	131	194	211	204	243
World total (estimate)	57,000	60,000	60,000	59,000	59,000

[1] Includes revisions of data published previously.

[2] Estimate.

[3] In addition, Canada produces less than 100 tons per year of peat fuel.

[4] Negligible.

B. Petroleum and Related Products

Carbon Black

By Donald S. Colby and Ann C. Mahoney

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GENERAL SUMMARY

CARBON-BLACK shipments, which had declined in the latter part of 1953, remained low in 1954 until after settlement of the labor strike that occurred in the rubber industry in July and August.

The production of new model automobiles in the last quarter of the year spurred the demand for rubber tires and consequently the demand for carbon black. Total shipments of 1,498 million pounds for the year were 4 percent below 1953.

Production was cut back faster than sales declined in order to reduce the large stocks of carbon black that had accumulated in 1952 and 1953. Consequently, stocks were reduced 89 million pounds in 1954.

Furnace blacks supplied over 80 percent of the shipments to rubber companies and for the first time exceeded contact blacks in quantity exported.

Furnace blacks were preferred for use in both synthetic and natural rubber, and the increase in the ratio of natural to synthetic consumed in 1954 had no significant effect on the relative demand for furnace and contact blacks.

TABLE 1.—Salient statistics of carbon black produced from natural gas and liquid hydrocarbons in the United States, 1950–54, in thousand pounds

	1950	1951	1952	1953	1954
Production:					
Contact process (chiefly channel)	616,765	645,881	563,597	453,345	378,741
Furnace processes	765,225	1,031,482	1,040,505	1,157,092	1,030,806
Total	1,381,990	1,677,363	1,604,102	1,610,437	1,409.547
Shipments:					
Domestic sales	1,109,071	1,129,645	1,154,274	1,200,871	1,095,256
Exports	399,568	433,493	292,908	358,620	402,777
Total	1,508,639	1,563,138	1,447,182	1,559,491	1,498,033
Losses	269	534	804	12	413
Stocks of producers Dec. 31	89,543	203,234	359,350	410,284	321,385
VALUE					
Production thousand dollars	84,604	107,436	101,988	104,868	91,375
Average per pound cents	6.12	6.41	6.36	6.51	6.48

SCOPE OF REPORT

Annual statistics of the carbon-black industry were obtained from reports submitted to the Bureau of Mines from all operating plants in the United States by producers who represent 100 percent of commercial production. Carbon black is a very pure grade of quasigraphitic carbon, with particle diameters ranging from 50 to 5,000 Angstrom units.

Export and import figures are compiled by the United States Department of Commerce. Monthly figures are based on reports prepared by the National Gas Products Association and adjusted to agree with the annual reports received by the Bureau of Mines.

Data are obtained on furnace and contact blacks, the two general types produced commercially. Substantially all contact blacks are made by the channel process. Furnace blacks are broken down into six grades: Semireinforcing Furnace (SRF), High-Modulus Furnace (HMF), Fast-Extruding Furnace (FEF), High-Abrasion Furnace (HAF), Thermal, and Other. Statistics on Superabrasion Furnace (SAF) and Intermediate-Abrasion Furnace (ISAF) are included in Other. The production and uses of the various grades are described in Minerals Yearbooks 1948 and 1949.

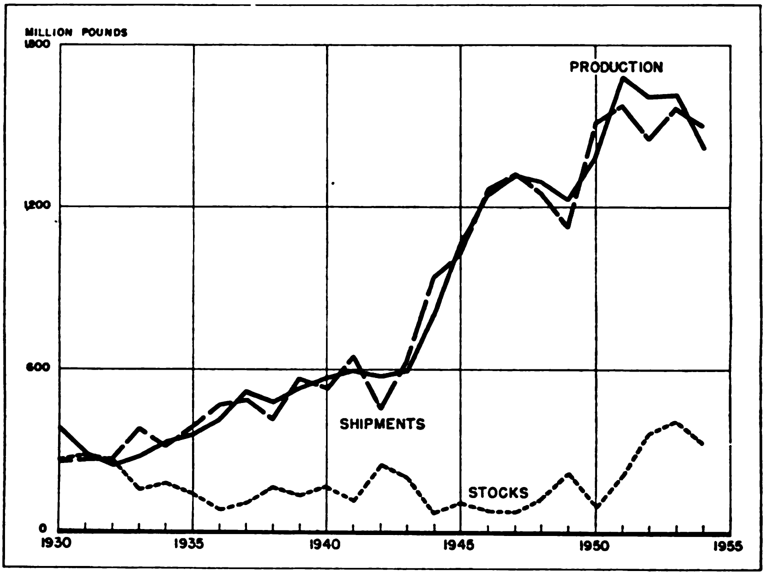

FIGURE 1.—Production, stocks, and shipments of carbon black, 1930–54.

PRODUCTION

Number and Capacity of Plants.—Four contact-type plants that produced in 1953 were idle in 1954. All were in Texas—three of them in the Panhandle. Combined capacity of these 4 plants was 119,300 pounds per day. Contact-type plants operating at the end of 1954 totaled 23, with a daily capacity of 1,134,000 pounds.

Two new oil-black furnace plants having a combined capacity of 200,000 pounds per day began operations in 1954; one was in Louisiana, the other in Oklahoma. Total number of furnace-type plants operating at the end of 1954 was 27, with a capacity of 4,157,500 pounds per day. The increase in overall furnace capacity was less than the capacity added by the new plants, because some plants

TABLE 2.—Carbon black produced from natural gas and liquid hydrocarbons in the United States, 1950–54, by States and districts, in thousand pounds

State and district	1950	1951	1952	1953	1954	Change from 1953 (percent)
Louisiana	226, 177	258, 989	255, 939	376, 818	368, 233	−2.3
Texas:						
Panhandle district	638, 159	700, 659	613. 298	542, 006	420, 798	−22.3
Rest of State	310, 705	449, 287	460, 462	444, 421	393, 622	−11.0
Total Texas	948, 864	1, 149, 946	1, 073, 760	986, 427	814, 420	−17.4
Other States	206, 949	268, 428	274, 403	247, 192	226, 894	−8.2
Grand total	1, 381, 990	1, 677, 363	1, 604, 102	1, 610, 437	1, 409, 547	−12.5

TABLE 3.—Carbon black produced in the United States in 1954, by States and districts, and natural gas and liquid hydrocarbons used in its manufacture

State	Producers reporting [1]	Number of plants	Production					
			Furnace black			Contact black		
			Thousand pounds	Value at plant		Thousand pounds	Value at plant	
				Total (thousand dollars)	Cents per pound		Total (thousand dollars)	Cents per pound
Louisiana	6	10	367, 689	21, 459	5. 84	544	116	21.3
Texas:								
Panhandle district	8	15	301, 798	18, 180	6. 02	119, 000	10, 165	8. 54
Rest of State	6	15	238, 642	16, 341	6. 85	154, 980	9, 418	6. 08
Total Texas	10	30	540, 440	34, 521	6. 39	273, 980	19, 583	7. 15
Arkansas	1	1	122, 677	7, 717	6. 29			
Oklahoma	1	1						
California	1	1				--------	--------	--------
Kansas	2	2						
New Mexico	5	5	--------	--------	--------	104, 217	7, 979	7. 66
Grand total:								
1954	15	50	1, 030. 806	63, 697	6. 18	378, 741	27, 678	7. 31
1953	16	52	1, 157, 092	69, 734	6. 03	453, 345	35, 134	7. 75

State	Natural gas used					Liquid hydrocarbons used			
	Million cubic feet	Average yield [2] (pounds per M cubic feet)		Value		Thousand gallons	Average yield (pounds per gallon)	Value	
		Furnace	Contact	Total (thousand dollars)	Average (cents per M cu. ft.)			Total (thousand dollars)	Average (cents per M cu. ft.)
Louisiana	25, 081	8. 35	0. 79	1, 725	6. 88	45, 923	3. 57	3, 589	7. 82
Texas:									
Panhandle district	76, 256	6. 88	1. 95	5, 723	7. 50	54, 184	3. 64	3, 463	6. 39
Rest of State	84, 806	5. 96	2. 15	5, 150	6. 07	42, 415	4. 08	2, 678	6. 31
Total Texas	161, 062	6. 10	2. 06	10, 873	6. 75	96, 599	3. 83	6, 141	6. 36
Arkansas	--------	--------	--------	--------	--------	12, 397	4. 79	590	4. 76
Oklahoma									
California	10, 519	6. 02	--------	1, 482	14. 09	--------	--------	--------	--------
Kansas									
New Mexico	54, 514	--------	1. 91	3, 430	6. 29	--------	--------	--------	--------
Grand total:									
1954	251, 176	6. 96	2. 01	17, 510	6. 97	154, 919	3. 83	10, 320	6. 66
1953	300, 942	7. 18	1. 92	17, 668	5. 87	187, 207	3. 68	14, 393	7. 69

[1] Detail will not add to totals, because some producers operate in more than 1 area.

[2] Partly estimated.

were producing new types of Superabrasion blacks, the processing of which results in lower yields.

Producers.—The number of carbon-black producers was reduced by 1 to 15 in 1954 with closing of the Combined Carbon Co. plant.

Method and Yield.—The production of oil and contact blacks was cut back more severely than gas-furnace-black production in 1954 partly because of the large withdrawals of channel and oil-furnace grades from stocks. The decline in HAF production was offset by increased output of Superabrasion-Furnace (SAF) and the related Intermediate-Abrasion-Furnace (ISAF) grades of oil black. The statistics of the Superabrasion grades are included in "Other" in table 4.

The yield from oil is less for the Superabrasion Furnace blacks than for the High-Abrasion Furnace grades. However, overall yield of blacks produced from oil increased from 3.68 pounds per gallon in 1953 to 3.83 pounds in 1954. Also the yield of contact black from gas increased to average 2.01 pounds per thousand cubic feet.

TABLE 4.—Production and shipments of carbon black in the United States in 1954, by months and grades, in thousand pounds

PRODUCTION

Month	Furnace							Contact	Total
	Thermal	SRF [1]	HMF [2]	FEF [3]	HAF [4]	Other	Total		
January	7,039	23,795	7,896	12,110	29,120	4,072	84,032	32,475	116,507
February	6,163	21,887	7,107	9,156	26,493	3,678	74,484	29,127	103,611
March	8,318	22,027	9,179	11,972	34,319	4,286	90,101	33,071	123,172
April	8,622	22,631	8,044	7,751	36,514	4,359	87,921	31,810	119,731
May	9,700	22,684	8,850	7,413	34,493	4,132	87,272	31,997	119,269
June	9,362	20,915	9,275	11,927	26,567	3,459	81,505	31,178	112,683
July	9,091	22,811	8,543	13,094	28,239	4,072	85,850	32,847	118,697
August	9,559	19,349	8,641	13,223	28,698	4,197	83,667	32,008	115,675
September	9,441	17,035	8,675	11,196	28,980	4,210	79,537	30,674	110,211
October	8,870	17,521	9,224	13,555	31,658	4,598	85,426	31,059	116,485
November	8,334	22,020	8,041	14,717	34,297	4,750	92,159	30,672	122,831
December	8,496	22,200	9,181	13,631	40,286	5,058	98,852	31,823	130,675
Total	102,995	254,875	102,656	139,745	379,664	50,871	1,030,806	378,741	1,409,547
SHIPMENTS (INCLUDING EXPORTS) [5]									
January	8,066	20,074	8,947	12,219	29,122	3,948	82,376	33,126	115,502
February	7,593	21,201	8,870	11,928	29,660	3,571	82,823	30,619	113,442
March	8,912	23,307	9,271	14,419	30,605	3,921	90,435	33,752	124,187
April	9,113	23,851	9,681	13,267	33,400	4,004	93,316	36,318	129,634
May	8,401	22,166	8,983	12,319	29,316	3,888	85,073	36,768	121,841
June	8,587	21,727	9,713	12,991	34,932	3,404	91,354	34,821	126,175
July	7,376	19,299	7,846	10,941	31,432	3,948	80,842	33,211	114,053
August	8,812	18,488	6,649	9,756	24,558	4,133	72,396	33,858	106,254
September	9,429	23,678	8,643	11,688	32,323	4,154	89,915	38,340	128,255
October	10,202	23,001	8,507	12,214	35,982	4,353	94,259	38,601	132,860
November	9,680	23,855	8,956	13,038	36,715	4,214	96,458	38,789	135,347
December	13,697	26,976	9,442	15,708	41,246	4,485	111,554	39,442	150,996
Total	109,868	267,623	105,508	150,488	389,291	48,023	1,070,801	427,645	1,498,446

[1] Semireinforcing Furnace.
[2] High-Modulus Furnace.
[3] Fast-Extrusion Furnace.
[4] High-Abrasion Furnace.
[5] Compiled from reports of the National Gas Products Association and of producing companies not included in the association figures. Figures adjusted to agree with annual reports of individual producers.

TABLE 5.—Natural gas and liquid hydrocarbons used in the manufacture of carbon black in the United States and average yield, 1950–54

	1950	1951	1952	1953	1954
Natural gas used__million cubic feet__	410,852	426,423	368,399	300,942	251,176
Average yield of carbon black per thousand cubic feet pounds__	2.57	2.67	2.87	3.06	3.83
Average value of natural gas used per thousand cubic feet cents__	4.79	5.21	5.46	5.87	6.89
Liquid hydrocarbons used__thousand gallons__	107,707	182,343	163,392	187,207	154,919
Average yield of carbon black per gallon__pounds__	3.02	2.96	3.35	3.68	3.83
Average value of liquid hydrocarbons used per gallon__cents__	------	------	8.15	7.69	6.66
Number of producers reporting__	20	20	18	16	15
Number of plants__	53	58	59	52	50

TABLE 6.—Number and capacity of carbon-black plants operated in the United States, 1953–54

State or district	County or parish	Number of plants				Total daily capacity (pounds)	
		1953		1954			
		Contact	Furnace	Contact	Furnace	1953	1954
Texas:							
Panhandle district__	Carson__	1	------	1	------	1,752,400	1,648,200
	Gray__	4	1	3	1		
	Hutchinson__	4	4	2	4		
	Moore__	2	1	2	1		
	Wheeler__	------	1	------	1		
Total Panhandle district__	------	11	7	8	7	1,752,400	1,648,200
Rest of State__	Aransas__	1	2	1	2	1,461,400	1,318,300
	Brazoria__	1	------	1	------		
	Brooks__	1	------	1	------		
	Ector__	1	------	1	------		
	Gaines__	1	------	1	------		
	Harris__	------	2	------	2		
	Howard__	------	1	------	1		
	Montgomery__	------	1	------	1		
	Nueces__	1	------	1	------		
	Reagan__	1	------	1	------		
	Terry__	------	1	------	1		
	Ward__	1	------	------	------		
	Winkler__	1	------	1	------		
Total, rest of State__	------	9	7	8	7	1,461,400	1,318,300
Total Texas__	------	20	14	16	14	3,213,800	2,966,500
Louisiana__	Avoyelles__	------	1	------	1	1,259,800	1,339,700
	Calcasieu__	------	1	------	1		
	Evangeline__	------	1	------	1		
	Ouachita__	------	2	------	2		
	Richland__	2	------	2	------		
	St. Mary__	------	2	------	3		
Total Louisiana__	------	2	7	2	8	1,259,800	1,339,700
Arkansas__	Union__	------	1	------	1	[1] 535,300	654,000
California__	Contra Costa__	------	1	------	1		
Kansas__	Grant__	------	2	------	2		
Oklahoma__	Texas__	------	------	------	1		
New Mexico__	Lea__	5	------	5	------	333,200	331,300
Total United States__	------	27	25	23	27	5,342,100	5,291,500

[1] Excludes Oklahoma in 1953.

CONSUMPTION AND USES

Domestic sales of carbon black declined 9 percent in 1954, primarily as the result of reduced sales of new automobiles and also because of a labor strike in the rubber industry which curtailed demand for carbon black. Another factor was a decline in average loading of carbon black in rubber from 825 pounds to 807 pounds per long ton. Natural rubber, which requires a lower loading than synthetic rubber, constituted 48 percent of the total virgin rubber consumption compared with 41 percent in 1953. Furnace black constituted 83 percent of the carbon-black sales to rubber companies compared with 82 percent in 1953.

TABLE 7.—Sales of carbon black for domestic consumption in the United States, 1950–54, by uses, in thousand pounds

Use	1950	1951	1952	1953	1954	Change from 1953 (percent)
Rubber	1,030,368	1,061,229	1,074,545	1,133,594	1,023,626	−9.7
Ink	50,903	45,496	44,116	45,801	48,797	6.5
Paint	11,139	11,366	10,628	8,464	7,681	−9.3
Miscellaneous	16,661	11,554	24,985	13,012	15,152	16.4
Total	1,109,071	1,129,645	1,154,274	1,200,871	1,095,256	−8.8

STOCKS

Total stocks declined 89 million pounds in 1954. Stocks of all grades were excessively high at the beginning of the year, and production cutbacks had been made in 1953 to permit stocks to be reduced.

TABLE 8.—Producers' stocks of contact- and furnace-type blacks in the United States, Dec. 31, 1950–54, in thousand pounds

Year	Furnace						Contact	Total
	SRF[1]	HMF[1]	FEF[1]	HAF[1]	Other	Total		
1950	5,275	[2] 6,276	[2] 3,381	7,831	1,438	24,201	65,342	89,543
1951	15,340	15,119	19,729	23,642	6,105	79,935	123,299	203,234
1952	31,220	33,375	23,211	31,509	4,464	123,779	235,571	359,350
1953	30,861	25,801	38,638	57,757	20,875	173,932	236,352	410,284
1954	18,113	22,949	27,895	48,130	[3] 16,850	133,937	187,448	321,385

[1] For explanation, see table 4.
[2] Adjusted figures (reclassification of grade).
[3] Includes thermal grade.

VALUE

There were no open-market price changes in carbon black during 1954. The average value of furnace blacks to producers rose again in 1954, as it has each year since figures became available in 1950. This rise reflects the shift in demand to the more expensive, more highly reinforcing grades rather than the increase in value of a particular grade.

The average value of natural gas used as raw material rose sharply to 7.0 cents per thousand cubic feet, an increase of over 1.0 cent per thousand in a year. The average value of oil feedstock declined.

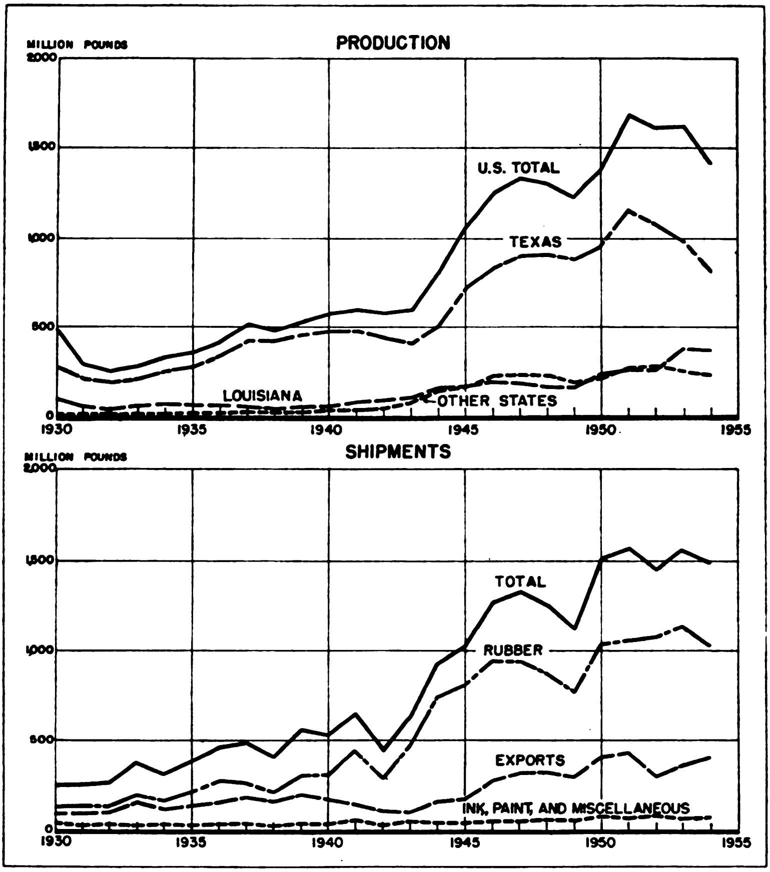

FIGURE 2.—Production and shipments of carbon black, 1930–54.

TABLE 9.—Prices of carbon black in carlots, f. o. b. plant, 1950–54, in cents per pound

[Oil, Paint and Drug Reporter]

Date	Channel blacks		Furnace blacks			
	Ordinary rubber grades [1]		Semireinforcing grades (SRF)	High-Modulus grades (HMF)	Fast Extrusion grades (FEF)	High-Abrasion grades (HAF)
	Bags	Bulk	Bags	Bags	Bags	Bags
Jan. 1, 1950	6.90	6.50	3.50	5.00	5.50	(2)
Oct. 1, 1950	7.40	7.00	4.00	5.50	6.00	(2)
Jan. 5, 1951	7.40	7.00	4.00	5.50	6.00	7.90
Jan. 1, 1952	7.40	7.00	4.00	5.50	6.00	7.90
Jan. 1, 1953	7.40	7.00	4.00	5.50	6.00	7.90
July 1, 1953	7.40	7.00	4.50	5.50	6.00	7.90
Jan. 1, 1954	7.40	7.00	4.50	5.50	6.00	7.90

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[1] Chiefly Easy-Processing (EPC) and Medium-Processing (MPC), but also includes Hard-Processing (HPC) and Conductive (CC) channel blacks

[2] No quotation.

TABLE 10.—Carbon black exported from the United States, 1952–54, by countries of destination

[U. S. Department of Commerce]

Country	1952		1953		1954	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
North America:						
Canada	56,943	$4,229	57,465	$4,301	37,812	$2,825
Cuba	816	69	862	72	1,268	111
Mexico	8,850	624	11,932	867	13,999	1,044
Other North America	61	7	19	2	76	8
Total North America	66,670	4,929	70,278	5,242	53,155	3,988
South America:						
Argentina	11,023	1,202	10,872	1,147	10,997	1,167
Brazil	22,272	1,920	15,987	1,507	31,411	2,869
Chile	1,961	182	1,670	136	2,985	248
Colombia	2,575	252	3,737	343	3,794	321
Ecuador	17	4	196	19	16	2
Peru	1,380	124	1,821	158	1,642	139
Uruguay	702	74	2,128	216	1,380	130
Venezuela	1,270	115	1,613	128	3,598	300
Other South America	17	4	5	1	20	3
Total South America	41,217	3,877	38,029	3,655	55,843	5,179
Europe:						
Austria	1,689	159	2,929	249	1,077	91
Belgium-Luxembourg	5,881	534	10,086	920	9,821	880
Denmark	864	83	748	68	888	94
Finland	833	72	748	71	853	75
France	54,661	4,941	66,360	5,949	73,606	6,680
Germany, West	2,259	263	1,570	201	9,987	1,071
Greece	265	26	313	28	402	36
Ireland	542	58	772	66	681	66
Italy	17,979	1,659	30,621	2,703	38,678	3,444
Netherlands	2,509	232	4,616	406	5,843	544
Norway	1,214	112	1,662	150	1,784	151
Portugal	899	78	1,065	86	2,009	163
Spain	4,982	446	5,008	474	5,570	511
Sweden	15,734	1,422	11,077	970	11,464	1,038
Switzerland	4,686	464	3,173	364	4,462	500
Trieste	180	11	----------	----------	230	16
Turkey	1,297	98	1,397	107	500	41
United Kingdom	11,122	1,274	31,739	3,346	32,981	3,479
Yugoslavia	112	12	874	87	533	55
Other Europe	89	11	26	2	----------	----------
Total Europe	127,797	11,955	174,784	16,247	201,369	18,935
Asia:						
India	12,144	1,130	9,181	832	12,733	1,086
Indochina	176	17	181	17	50	5
Indonesia	3,715	386	3,790	362	4,556	409
Israel and Palestine	224	20	1,610	132	2,815	229
Japan	7,497	739	17,846	1,723	13,322	1,290
Malaya	885	88	442	41	748	64
Pakistan	401	41	299	34	358	39
Philippines	95	9	292	25	302	17
Taiwan	312	37	74	8	140	13
Other Asia	313	34	213	27	678	73
Total Asia	25,762	2,501	33,928	3,201	35,702	3,225
Africa:						
Union of South Africa	14,131	1,310	[1] 18,864	[1] 1,763	18,542	1,634
Other Africa	152	18	230	20	215	17
Total Africa	14,283	1,328	19,094	1,783	18,757	1,651
Oceania:						
Australia	16,475	1,445	20,187	1,720	34,319	2,872
New Zealand	704	65	2,320	206	3,632	313
Total Oceania	17,179	1,510	22,507	1,926	37,951	3,185
Grand total	292,908	26,100	358,620	32,054	402,777	36,163

[1] Revised figure.

FOREIGN TRADE

Imports.—Imports of acetylene black from Canada declined from 10.2 [1] million pounds in 1953 to 7.7 million in 1954. The average value increased from 15.9 cents per pound to 16.6 cents.

The United Kingdom, our only other source, provided 75,000 pounds.

Exports.—Exports of carbon black, particularly furnace black, increased in 1954, and exports of furnace black exceeded exports of contact black for the first time. Although exports to Canada decreased 20 million pounds as the result of the operation of the first furnace-black plant in that country, increases to Australia, South America, and western Europe more than compensated for this decline.

Furnace-black exports were considerably larger than contact-black exports to Mexico, Italy, and West Germany, whereas contact-black exports predominated to the United Kingdom and Australia.

TABLE 11.—Carbon black exported from the United States in 1954, by months in thousand pounds

[U. S. Department of Commerce]

Month	Contact	Furnace	Total	Month	Contact	Furnace	Total
January	15,996	13,993	29,989	August	16,861	18,053	34,914
February	16,424	14,888	31,312	September	16,790	17,876	34,666
March	13,629	15,126	28,755	October	18,381	19,614	37,995
April	17,840	15,850	33,690	November	14,661	18,631	33,292
May	17,773	14,954	32,727	December	16,759	21,089	37,848
June	15,950	17,491	33,441				
July	18,615	15,533	34,148	Total:			
				1954	199.679	203,098	402,777
				1953	194,634	163,986	358,620

WORLD PRODUCTION

Carbon-black production in England reached 147 million pounds in 1954, an increase of 44 million pounds.

Production in Japan declined to 16 million pounds from 19 million [2] in 1953.

Yugoslavia produced 2 million pounds of carbon black in 1954.

Carbon-black was also known to have been produced in West Germany and in Canada.

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[1] Figures on imports from Canada in 1952 and 1953 have been revised. Acetylene-black imports, 1952, 8.8 million pounds valued at 15.3 cents per pound; 1953, 10.2 million pounds valued at 15.9 cents per pound. Carbon-black imports: none imported in 1952 or 1953.

[2] Revised figure.

Natural Gas

By Donald S. Colby, Ann C. Mahoney, and Lulie V. Harvey

⁂

GENERAL SUMMARY

MARKETED production of natural gas in the United States rose 4 percent in 1954. Consumption, however, increased over 5 percent as a result of larger withdrawals from storage and smaller transmission losses than in 1953.

Because of colder weather and a decline in industrial activity in 1954, residential use increased 12 percent and commercial use 10 percent, whereas industrial consumption increased only 4 percent.

Interstate shipments increased at a more rapid rate than marketed production in 1954. The quantity of out-of-State gas piped to California and New England continued to increase rapidly. Nevada received natural gas for the first time.

Average values, both at the wellhead and at point of consumption, continued upward in 1954 but at a somewhat slower rate than in 1953.

TABLE 1.—Salient statistics of natural gas in the United States, 1950–54

	1950	1951	1952	1953	1954
MILLION CUBIC FEET					
Supply:					
Marketed production [1]	6, 282, 060	7, 457, 359	8, 013, 457	8, 396, 916	8, 742, 546
Withdrawn from storage	175, 260	209, 428	221, 909	246, 802	330, 177
Imports			7, 807	9, 225	6, 847
Total supply	6, 457, 320	7, 666, 787	8, 243, 173	8, 652, 943	9, 079, 570
Disposition:					
Consumption	6, 026, 404	7, 102, 562	7, 613, 478	7, 979, 338	8, 402, 852
Exports	25, 727	24, 163	27, 456	28, 322	28, 726
Stored	229, 752	347, 690	398, 593	404, 838	432, 283
Lost in transmission, etc	175, 437	192, 372	203, 646	240, 445	215, 709
Total disposition	6, 457, 320	7, 666, 787	8, 243, 173	8, 652, 943	9, 079, 570
VALUE					
Production (at wells)...thousand dollars	408, 521	542, 964	623, 649	774, 966	882, 501
Average per M cubic feet...cents	6. 5	7. 3	7. 8	9. 2	10. 1

[1] Comprises gas sold or consumed by producers, including losses in transmission, amounts added to storage, and increases in gas in pipelines.

SCOPE OF REPORT

Data on natural-gas production, consumption, and value are collected by annual questionnaires sent to producers of oil and gas, natural-gasoline-plant operators, gas-pipeline companies, and gas-utility companies. A separate report is filed by the respondent for each State in which he operates.

Volumes are reported at the pressure base selected by the reporting company; however, if the reported pressure base deviates more than 5 percent from 14.65 p. s. i. a. at 60° F., it is corrected to 14.65 p. s. i. a.

Reports are received covering approximately 75 percent of gross natural-gas production. The large number of respondents and the difficulty of contacting each small producer make direct compilation of total production impractical. The output of nonreporting producers will, in most instances, be accounted for in the purchases of reporting companies. Marketed production for each State equals consumption in the State, plus gas placed in storage, plus shipments to other States, less gas withdrawn from storage, less receipts from other States.

Gross production equals marketed production, plus the quantity repressured, plus the partly estimated quantity vented and wasted. Quantity of gas vented and wasted is compiled from data given on the reporting forms, supplemented by estimates of waste derived from figures published by Natural Gas Reserves Committee of the American Gas Association and State conservation bodies.

GOVERNMENT REGULATIONS

On March 27, 1954, President Eisenhower signed into law the Hinshaw amendment [1] to the Natural-Gas Act. This amendment that became section 1 (c) of the act provides that any company that purchases natural gas at or within a State boundary is exempted from provisions of the act if all of the gas so purchased is consumed within that State and if the rates, services, and facilities are regulated by a State commission.

On April 15, 1954, the Federal Power Commission issued Opinion 269 in the Panhandle Eastern Pipeline Co. case, which, for the first time allowed a pipeline company to use the average field price as the value of its own production, rather than a price determined on an original cost basis.

The Supreme Court ruled on June 7, 1954,[2] that independent natural-gas producers selling gas in interstate commerce for resale to the ultimate consumer come within the meaning of the term "natural-gas company" as defined in the Natural Gas Act and that its sales in interstate commerce are subject to the jurisdiction of, and regulation by, the Federal Power Commission.

On July 16, 1954, the Federal Power Commission issued Order 174 designed to enforce the Supreme Court decision in the Phillips case. This order required independent producers who sell gas for interstate transmission to file existing sales contracts with the Federal Power Commission; to make no change in these rates without FPC approval; and to obtain from the FPC a certificate authorizing the sale of gas in interstate commerce before initiating such a sale.

RESERVES

The American Gas Association Committee on Natural Gas Reserves reported that estimated proved recoverable reserves of natural gas on December 31, 1954, totaled 211.7 trillion cubic feet. The estimated annual increase in reserves for 1954 was the smallest since the com-

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[1] *Public Law 323, 68 Stat. 36, 15 U. S. C. 717* (c).

[2] 347 U. S. 672, *Phillips Petroleum Co.* v. *Wisconsin et al.*

TABLE 2.—Estimated proved recoverable reserves of natural gas in the United States, 1953–54 in million cubic feet [1]

[Committee on Natural-Gas Reserves, American Gas Association]

State	Reserves [2] as of Dec. 31, 1953	Changes in reserves during 1954			
		Extensions and revisions [2]	Discoveries of new fields and new pools in old fields [2]	Net change in underground storage [3]	Net production [4]
Arkansas	1,211,266	—19,422	3,872	1,689	32,026
California [5]	9,159,347	287,939	59,110	—11,255	468,538
Colorado	1,864,275	—49,945	174,374	0	55,791
Illinois	231,251	33,206	4,048	19,802	34,551
Indiana	35,830	7,258	285	—1,274	6,050
Kansas	15,787,602	179,140	233,601	10,768	452.779
Kentucky	1,301,533	44,815	10,340	1,919	72,000
Louisiana [5]	34,458,912	2,595,319	1,252,836	0	1,507,081
Michigan	275,519	37,163	7,961	19,093	9,636
Mississippi	2,569,181	361,267	8,750	159	166,674
Montana	764,000	—31,127	22,674	1,179	32,995
Nebraska	182,110	6,742	17,009	0	12,915
New Mexico	17,522,210	—331,033	549,760	—26,636	473,632
New York	71,004	298	0	1,913	3,853
Ohio	755,982	27,859	8,780	13,651	31,531
Oklahoma	12,228,373	771,691	247,151	6,914	857,981
Pennsylvania	751,844	72,034	21,325	45,010	158,050
Texas [5]	106,529,626	1,278,190	2,078,659	6,002	4,763,415
Utah	1,113,058	—716,993	7,733	0	16,423
West Virginia	1,653,942	100,743	22,000	104	169,499
Wyoming	2.739,631	—27,018	229,019	1,868	88,429
Other States [6]	240,636	4,183	7,607	0	12,660
Total	211,447,132	4,632,309	4,966,894	90,906	9,426,509

State	Reserves as of Dec. 31, 1954 [2]				
	Non-associated [7]	Associated [8]	Dissolved [9]	Underground storage [10]	Total
Arkansas	517,112	361,927	279,437	6,903	1,165,379
California [5]	2,270,399	2,120,603	4,583,222	52,379	9,026,603
Colorado	1,173,662	57,097	702,154	0	1,932.913
Illinois	2,500	9,863	221,591	19,802	253,756
Indiana	2,350	2,802	25,433	5,464	36,049
Kansas	15,149,660	214,253	342,457	51,962	15,758.332
Kentucky	1,208,155	0	57,133	21,319	1,286.607
Louisiana [5]	29,276,768	4,939,363	2,583,855	0	36,799.986
Michigan	31,194	20,000	65,703	213,203	330,100
Mississippi	2,029,557	478,232	264,082	812	2,772,683
Montana	576,628	33,262	83,555	30,286	723,731
Nebraska	112,003	13,960	66,983	0	192,946
New Mexico	13,703,708	1,720,055	1,745,829	71,077	17,240,669
New York	38,962	0	403	29,997	69,362
Ohio	506,483	0	29,723	238,535	774,741
Oklahoma	6,563,227	2,014,666	3,736,573	81,682	12,396,148
Pennsylvania	439,503	0	34,728	257,932	732.163
Texas [5]	68,536,851	20,856,529	15,722,881	13,301	105,129,062
Utah	384,543	0	2,832	0	387,375
West Virginia	1,384,056	0	57,116	166,118	1,607,290
Wyoming	2,095,562	153,495	586,158	19,856	2,855,071
Other States [6]	73,686	0	166,080	0	239,766
Total	146,076,069	32,996,107	31,357,928	1,280,628	211,710,732

[1] Volumes are reported at a pressure base of 14.65 p. s. i. a. and at a standard temperature of 60° F.

[2] Excludes gas loss due to recovery of natural-gas liquids.

[3] The net difference between gas stored in and gas withdrawn from underground storage reservoirs inclusive of adjustments and native gas transferred from other reserve categories.

[4] Net production equals gross withdrawals less gas injected into producing reservoirs; changes in underground storage and gas loss due to recovery of natural-gas liquids are excluded. Fourth quarter production estimated in some instances.

[5] Includes offshore reserves.

[6] Includes Alabama, Arizona, Florida, Maryland, Missouri, North Dakota, and Virginia.

[7] Nonassociated gas is free gas not in contact with crude oil in the reservoir.

[8] Associated gas is free gas in contact with crude oil in the reservoir.

[9] Dissolved gas is gas in solution with crude oil in the reservoir.

[10] Gas held in underground reservoirs (including native and net injected gas) for storage purposes.

mittee began making estimates in 1946, mostly because of the downward revisions of some of the previous year's estimates.

PRODUCTION

GROSS WITHDRAWAL

Gross withdrawals of natural gas increased 3 percent in 1954. The increase was accounted for by increased production from gas wells,

TABLE 3.—Gross withdrawals and disposition of natural gas in the United States, 1953–54, by States, in million cubic feet

State	Gross withdrawals[1]			Disposition		
	From gas wells	From oil wells	Total	Marketed production[2]	Repressuring	Vented and wasted[3]
1953						
Arkansas	38, 100	27, 000	65, 100	41, 510	20, 003	3, 587
California	200, 700	590, 000	790, 700	531, 346	252, 145	7, 209
Colorado	19, 000	28, 200	47, 200	28, 509	7, 235	11, 406
Illinois	650	34, 000	34, 650	9, 282	1, 174	24, 194
Indiana	130	7, 060	7, 190	701	39	6, 450
Kansas	415, 000	60, 000	475, 000	420, 607	1, 079	53, 314
Kentucky	71, 000	2, 700	73, 700	71, 405	----------	2, 295
Louisiana	1, 246, 000	350, 000	1, 596, 000	1, 293, 644	216, 474	85, 882
Maryland	1, 408	----------	1, 408	1, 408	----------	----------
Michigan	5, 500	5, 000	10, 500	7, 774	1, 215	1, 511
Mississippi	180, 000	75, 000	255, 000	154, 254	53, 223	47, 523
Montana	25, 400	3, 000	28, 400	27, 889	294	217
Nebraska	5, 400	2, 000	7, 400	6, 748	191	461
New Mexico	208, 000	245, 000	453, 000	399, 086	3, 260	50, 654
New York	2, 200	200	2, 400	2, 347	----------	53
North Dakota	370	5, 200	5, 570	498	----------	5, 072
Ohio	36, 400	1, 800	38, 200	37, 542	34	624
Oklahoma	460, 000	425, 000	885, 000	599, 955	92, 136	192, 909
Pennsylvania	103, 800	2, 500	106, 300	105, 558	275	467
Texas	3, 835, 000	1, 624, 000	5, 459, 000	4, 383, 158	779, 054	296, 788
Utah	6, 870	390	7, 260	7, 075	----------	185
Virginia	3, 697	----------	3, 697	3, 697	----------	----------
West Virginia	184, 000	4, 000	188, 000	186, 477	453	1, 070
Wyoming	46, 500	58, 400	104, 900	76, 262	10, 272	18, 366
Other States[4]	112	111	223	184	----------	39
Total	7, 095, 237	3, 550, 561	10, 645, 798	8, 396, 916	1, 438, 606	810, 276
1954						
Arkansas	36, 000	20, 000	56, 000	33, 471	18, 568	3, 961
California	190, 000	569, 000	759, 000	507, 289	242, 422	9, 289
Colorado	26, 000	50, 000	76, 000	45, 705	19, 335	10, 960
Illinois	300	36, 000	36, 300	9, 475	443	26, 382
Indiana	100	6, 000	6, 100	735	50	5, 315
Kansas	390, 000	72, 000	462, 000	412, 369	2, 203	47, 428
Kentucky	71, 000	3, 700	74, 700	72, 713	----------	1, 987
Louisiana	1, 325, 000	375, 000	1, 700, 000	1, 399, 222	215, 491	85, 287
Maryland	1, 394	----------	1, 394	1, 394	----------	----------
Michigan	4, 500	5, 600	10, 100	6, 962	1, 876	1, 262
Mississippi	167, 000	70, 000	237, 000	140, 448	58, 645	37, 907
Montana	27, 000	3, 700	30, 700	30, 252	178	270
Nebraska	5, 500	3, 500	9, 000	6, 801	----------	2, 199
New Mexico	277, 000	216, 000	493, 000	449, 346	4, 043	39, 611
New York	2, 500	500	3, 000	2, 598	----------	402
North Dakota	400	8, 000	8, 400	1, 093	----------	7, 307
Ohio	29, 000	2, 000	31, 000	28, 824	57	2, 119
Oklahoma	503, 000	410, 000	913, 000	616, 355	106, 119	190, 526
Pennsylvania	144, 400	2, 300	146, 700	145, 934	214	552
Texas	4, 020, 000	1, 600, 000	5, 620, 000	4, 551, 232	840, 070	228, 698
Utah	16, 000	400	16, 400	16, 024	----------	376
Virginia	1, 401	----------	1, 401	1, 401	----------	----------
West Virginia	189, 000	4, 000	193, 000	191, 601	137	1, 262
Wyoming	39, 400	61, 000	100, 400	71, 068	8, 886	20, 446
Other States[4]	112	143	255	234	----------	21
Total	7, 466, 007	3, 518, 843	10, 984, 850	8, 742, 546	1, 518, 737	723, 567

[1] Marketed production plus quantities used in repressuring, vented, and wasted.

[2] Gas sold or consumed by producers (see table 1, footnote 1).

[3] Includes gas (mostly residue) blown to the air but does not include direct waste on producing properties, except where data are available.

[4] Alabama, Florida, Missouri, South Dakota, and Tennessee.

as withdrawals from oil wells declined. The volume of gas vented and wasted declined sharply, chiefly in Texas. At least part of the decrease in the quantity vented in Texas can be attributed to the increase in the quantity of gas repressured in that State.

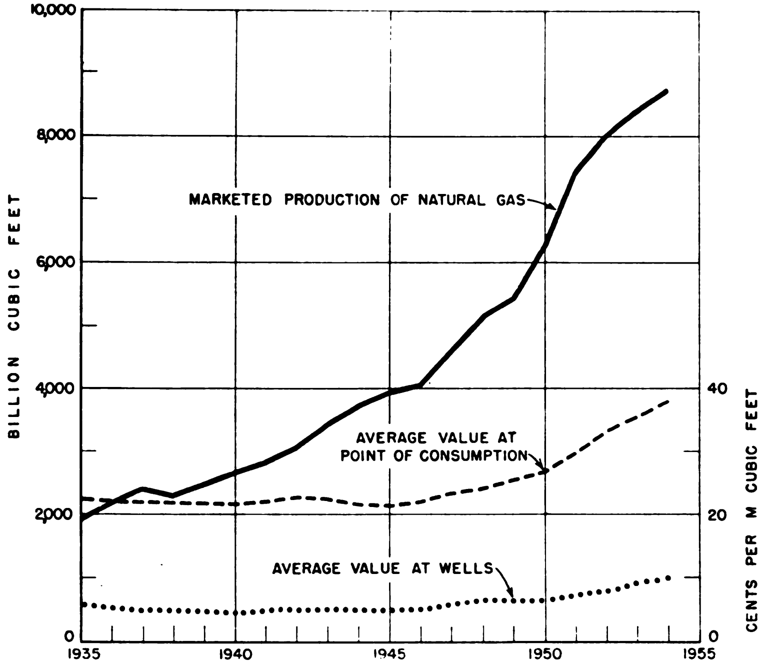

Figure 1.—Production and average value of natural gas in the United States, 1953–54.

STORAGE

Total withdrawals from storage increased sharply in 1954, chiefly because of the unusually cold weather in the last quarter of the year. The largest increases in withdrawals were in Michigan, Pennsylvania, and West Virginia.

The American Gas Association Committee on Underground Storage reported that on December 31, 1954, 172 storage pools were in operation, with an estimated total reservoir capacity of 1,859 billion cubic feet. In 1953 there were 167 pools.

MARKETED PRODUCTION

The marketed production of natural gas increased 4 percent in 1954 compared with 5 percent in 1953. The lower gain in production in 1954 was not due to a reduced rate of growth of consumption but rather to a reduction in transmission losses and larger withdrawals from underground storage.

The 1.7-percent decrease in production of crude oil in 1954 was accompanied by a decline in production of oilwell gas, which would have ordinarily gone for interruptible sales.

TABLE 4.—Natural gas stored underground in and withdrawn from storage fields, 1953–54 by State of location, in million cubic feet

State	1953			1954		
	Total stored	Total withdrawn	Net stored	Total stored	Total withdrawn	Net stored
Arkansas	1,920	416	1,504	-------	-------	-------
California	15,895	15,619	276	19.708	15,334	4,374
Illinois	12,372	545	11,827	8,511	1,574	6,937
Indiana	1,350	641	709	2,487	1,534	953
Iowa	-------	-------	-------	27	6	21
Kansas	22,172	15,200	6,972	28,697	19,929	8,768
Kentucky	7,417	5,774	1,643	7,543	6,555	988
Louisiana	-------	-------	-------	66	81	−15
Michigan	57.512	39,225	18.287	61,430	58,421	3,009
Mississippi	266	63	203	303	158	145
Montana	4.012	1,039	2,973	2,804	1.676	1,128
New Mexico	9.535	3,554	6,281	6,287	5,659	628
New York	10,318	7.068	3,250	10,164	9.711	453
Ohio	64,395	39,788	24,607	63,912	49,469	14,443
Oklahoma	27,706	15.598	12,108	20,636	13.203	7,433
Pennsylvania	79,617	49,140	30,477	105,966	67,310	38,656
Tennessee	145	-------	145	-------	-------	-------
Texas	3,985	5.849	−1,864	9.322	8.047	1,275
West Virginia	80,400	46,465	33,935	79,933	69,784	10,149
Wisconsin	-------	-------	-------	140	-------	140
Wyoming	5,521	818	4,703	4,347	1,726	2,621
Total	404,838	246,802	158,036	432,283	330,177	102,106

TABLE 5.—Marketed production of natural gas in the United States, 1950–54, by States [1]

State	Quantity (million cubic feet)					Change from 1953 (percent)	Estimated value at wells (thousand dollars)	
	1950	1951	1952	1953	1954		1953	1954
Alabama	2	1	4	41	87	112.2	2	5
Arkansas	48,047	44,656	42,325	41,510	33,471	−19.4	2,200	1,841
California	558.398	566,751	517.450	531,346	507,289	−4.5	104,675	104,502
Colorado	11,168	14,128	34.260	28,509	45,705	60.3	1,654	3,976
Florida	8	10	15	34	35	2.9	2	3
Illinois	13,295	11,425	10,183	9,282	9,475	2.1	1,559	1,345
Indiana	956	845	836	701	735	4.9	49	44
Kansas	364,024	417,538	412,544	420,607	412.369	−1.9	36,172	43,711
Kentucky	73,316	76,097	73,427	71.405	72,713	1.8	15.638	16,579
Louisiana	831,771	1,054,199	1,237,143	1,293.644	1,399.222	8.2	106,079	124.531
Maryland	373	3,422	2,372	1,408	1,394	−1.0	268	282
Michigan	11,250	11,194	9,052	7.774	6,962	−10.5	1,275	1,239
Mississippi	114.153	158,845	174,100	154,254	140,448	−8.9	12,340	11,657
Missouri	21	14	16	15	16	6.7	3	3
Montana	39,186	36.424	28,714	27,889	30,252	8.5	1,645	2,057
Nebraska	17	3.895	5,568	6.748	6,801	.8	911	796
New Mexico	212,909	300,169	359,377	399,086	449.346	13.0	24,344	35,049
New York	3,336	3,214	3,627	2,347	2,598	10.7	742	847
North Dakota	608	456	369	498	1.093	119.5	34	69
Ohio	43,163	38,879	30,993	37,542	28,824	−23.2	8,334	6,111
Oklahoma	482,360	538,756	554,033	599,955	616,355	2.7	41,397	43,145
Pennsylvania	91,137	128,715	108,684	105,558	145.934	38.3	30,717	43,634
South Dakota	-------	7	6	5	7	40.0	(2)	(2)
Tennessee	132	132	107	89	89	.0	11	10
Texas	3,126,402	3,781,136	4,147,805	4,383,158	4,551,232	3.8	333,120	386,855
Utah	3,950	3,733	3.006	7,075	16,024	126.5	807	2,259
Virginia	46	64	1,133	3,697	1,401	−62.1	954	380
West Virginia	189,980	191.146	180,995	186,477	191,601	2.7	44.009	45,601
Wyoming	62,062	71.508	75.313	76.262	71,068	−6.8	6,025	5,970
Total	6,282,060	7,457,359	8,013,457	8,396,916	8,742,546	4.1	774,966	882,501

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[1] Comprises gas either sold or consumed by producers, including losses in transmission, amounts added to storage, and increases of gas in pipelines.

[2] Less than $500.

Of the smaller producing States, North Dakota and Utah had outstanding increases in marketed production as outlets for their gas became available. Production in Pennsylvania increased 38 percent as the result of the development of the Driftwood-Benezette pool.

NUMBER OF WELLS

The number of gas wells drilled in 1954 exceeded the high level attained in 1953. In Pennsylvania completions increased from 254 in 1953 to 483 in 1954. The rapid rate of development in New Mexico during 1953, when 600 gas wells were completed, was not sustained in 1954, and completions dropped to 392. There were over 70,000 producing gas wells in the United States at the end of 1954.

TABLE 6.—Gas wells in the United States, 1953–54, by States

State	Drilled during 1953 [1]	Producing Dec. 31, 1953	Drilled during 1954 [1]	Producing Dec. 31, 1954
Arkansas	1	230	10	240
California	48	420	47	460
Colorado	63	55	72	75
Illinois	4	25	4	25
Indiana	22	450	12	425
Kansas	380	4. 600	381	4, 800
Kentucky	194	3, 900	214	4, 000
Lousiana	222	3, 200	288	3, 500
Michigan	19	280	10	250
Mississippi	12	220	8	235
Missouri	-----------	27	20	37
Nebraska	12			
Montana	22	1, 000	17	1, 050
New Mexico	600	1, 500	392	1, 800
New York	-----------	1, 300	2	1, 250
Ohio	176	6, 100	251	6, 100
Oklahoma	339	3, 900	383	4, 000
Pennsylvania	254	16, 700	483	16, 500
Tennessee	1	27	-----------	28
Texas	978	10, 200	912	11, 200
West Virginia	420	13, 800	427	13, 900
Wyoming	25	180	29	200
Alabama, Maryland, North Dakota, South Dakota, Utah, and Virginia	14	109	15	117
Total	3, 806	68, 200	3, 977	70, 200

[1] From Oil and Gas Journal.

DEVELOPMENT AND PRODUCTION BY STATES

Kentucky.—C. D. Hunter, chief geologist, Kentucky-West Virginia Gas Co., reported that the Big Sandy gas field was extended 2 miles to the south to within 7 miles of the Pine Mountain overthrust fault. During 1954 also extensive exploration for new gas production was begun in Clay, Leslie, Breathitt and Harlan Counties, with results favorable enough to warrant further exploration.

New Mexico.—Several discoveries of gas in the Dakota sand in northern San Juan County should stimulate exploration of this formation. The first Tertiary gas discovery in the San Juan Basin was completed in Rio Arriba County and may result in a reevaluation of the producing potentiality of the Tertiary period. Extensions were made in the Pictured Cliffs sandstone, but no outer limits have been defined. Authorization by the Federal Power Commission for the construction of a pipeline by Pacific Northwest Pipeline Corp. from the San Juan Basin to Oregon and Washington will increase drilling activity in the Basin.

New York.—W. L. Kreidler, senior geologist, New York State Museum and Science Service, reported that a wildcat well drilled in Ulster County near Phoenicia found gas in the Schoharie-Esopus strata. Over 30,000 acres were leased by the end of the year on the basis of this find.

North Dakota.—Wilson M. Laird, State geologist, North Dakota Geological Survey, reported that a natural-gasoline plant began operating at Tioga in 1954 to process wet gas. No pipeline outlet was available for the dry residue gas from the plant.

Pennsylvania.—J. G. Montgomery, Jr., president, United Natural Gas Co., reported that continued intensive development of the Driftwood-Benezette Pool in Cameron, Elk, and Clearfield Counties was the most important natural-gas activity in 1954. During the year 123 producing wells were drilled in this pool, and its proved area was extended from 21,000 acres to 24,000.

INTERSTATE SHIPMENTS AND EXPORTS

Interstate shipments of natural gas increased 11 percent in 1954, the same percentage of increase as in 1953. These shipments accounted for 53 percent of marketed production in 1954 compared with 50 percent in 1953. Most of the additional shipments originated in Texas, New Mexico, and Louisiana. California consumed over 100,000 million cubic feet more out-of-State gas than in 1953. The remainder was scattered widely throughout the States.

TABLE 7.—Interstate shipments, imports, and exports of natural gas in 1954, by sources and final destination,[1] in million cubic feet

Producing region and State or country	Quantity shipped	Consuming State or country	Quantity received[2]
Middle Atlantic:			
New Jersey	----------	Canada	277
New York	204	Connecticut	569
Pennsylvania	67, 531	Delaware	16
		District of Columbia	76
		Maryland	270
		Massachusetts	1, 772
		New Hampshire	60
		New Jersey	1, 242
		New York	55, 719
		Ohio	7, 299
		Pennsylvania	229
		Rhode Island	206
Total	67, 735	Total	67, 735
South Atlantic:			
Delaware	----------	Canada	3
District of Columbia	----------	District of Columbia	5, 852
Florida	----------	Kentucky	685
Georgia	----------	Maryland	13, 276
Maryland	561	New Jersey	21
North Carolina	----------	New York	3, 391
South Carolina	----------	Ohio	65, 659
Virginia	1, 347	Pennsylvania	39, 421
West Virginia	140, 459	Tennessee	13
		Virginia	13, 142
		West Virginia	904
Total	142, 367	Total	142, 367

See footnotes at end of table.

TABLE 7.—Interstate shipments, imports, and exports of natural gas in 1954, by sources and final destination,[1] in million cubic feet—Continued

Producing region and State or country	Quantity Shipped	Consuming State or country	Quantity received [2]
East North Central:			
Illinois		Canada	11
Indiana	1,476	Connecticut	15
Michigan	11	Illinois	312
Ohio		Maryland	2
Wisconsin		Massachusetts	41
		New Jersey	65
		New York	74
		Ohio	641
		Pennsylvania	315
		Rhode Island	8
		West Virginia	3
Total	1,487	Total	1,487
East South Central:			
Alabama		Alabama	35,575
Kentucky	45,430	Canada	5
Mississippi	108,170	Connecticut	353
Tennessee		Delaware	45
		District of Columbia	1,000
		Florida	4,364
		Georgia	40,387
		Illinois	1
		Indiana	64
		Kentucky	323
		Maryland	2,342
		Massachusetts	1,012
		New Jersey	1,996
		New York	2,878
		North Carolina	92
		Ohio	37,100
		Pennsylvania	12,340
		Rhode Island	197
		South Carolina	3,441
		Tennessee	181
		Virginia	2,413
		West Virginia	7,491
Total	153,600	Total	153,600
West North Central:			
Iowa		Canada	1,729
Kansas	326,923	Colorado	36,354
Minnesota		Connecticut	15
Missouri		District of Columbia	1
Nebraska		Illinois	23,124
North Dakota	20	Indiana	18,523
South Dakota		Iowa	37,829
		Kansas	107
		Maryland	2
		Massachusetts	44
		Michigan	37,161
		Minnesota	51,565
		Missouri	50,634
		Montana	13
		Nebraska	44,233
		New Jersey	68
		New York	72
		North Dakota	3
		Ohio	18,278
		Oklahoma	1,405
		Pennsylvania	430
		Rhode Island	8
		South Dakota	4,473
		West Virginia	5
		Wisconsin	85
		Wyoming	782
Total	326,943	Total	326,943

See footnotes at end of table.

TABLE 7.—Interstate shipments, imports, and exports of natural gas in 1954, by sources and final destination,[1] in million cubic feet—Continued

Producing region and State or country	Quantity shipped	Consuming State or country	Quantity received[2]
West South Central:			
Arkansas	1, 080	Alabama	106, 187
Louisiana	859, 924	Arizona	43, 544
Oklahoma	287, 546	Arkansas	167, 919
Texas	2, 419, 693	California	194, 140
		Canada	4, 091
		Colorado	75, 119
		Connecticut	11, 171
		Delaware	3, 121
		District of Columbia	7, 953
		Florida	19, 265
		Georgia	91, 892
		Illinois	372, 490
		Indiana	106, 782
		Iowa	82, 018
		Kansas	223, 946
		Kentucky	85, 580
		Louisiana	94, 331
		Maryland	19, 242
		Massachusetts	34, 419
		Mexico	21, 230
		Michigan	152, 801
		Minnesota	59, 337
		Mississippi	106, 530
		Missouri	142, 075
		Nebraska	36, 057
		New Hampshire	1, 062
		New Jersey	66, 550
		New Mexico	48, 708
		New York	172, 692
		North Carolina	10, 277
		Ohio	313, 205
		Oklahoma	18, 481
		Pennsylvania	273, 327
		Rhode Island	4, 278
		South Carolina	13, 936
		South Dakota	5, 144
		Tennessee	117, 340
		Texas	98, 661
		Virginia	22, 010
		West Virginia	97, 384
		Wisconsin	42, 253
		Wyoming	1, 695
Total	3, 568, 243	Total	3, 568, 243
Mountain:			
Arizona		Arizona	33, 334
Colorado	31, 786	California	266, 100
Idaho		Canada	15
Montana	5, 272	Colorado	1, 193
Nevada		Iowa	3, 951
New Mexico	324, 792	Kansas	5, 777
Utah		Mexico	1, 365
Wyoming	32, 826	Minnesota	5, 514
		Montana	9, 184
		Nebraska	9, 269
		Nevada	1, 052
		New Mexico	9, 456
		North Dakota	3, 887
		Oklahoma	104
		South Dakota	6, 089
		Texas	11, 522
		Utah	26, 191
		Wyoming	673
Total	394, 676	Total	394, 676
Foreign: Canada	6, 847	Montana	6, 847
Grand total	4, 661, 898	Grand total	4, 661, 898

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[1] Includes exports as follows: 6,131 million cubic feet to Canada and 22,595 million cubic feet to Mexico.
[2] Includes amounts consumed, stored, and lost in transmission.

Imports and Exports.—Again in 1954 the only import of natural gas was from Canada to Montana. Exports to Canada and Mexico remained substantially the same as in 1953.

PIPELINES

Certificates of public convenience and necessity for natural-gas facilities issued by the Federal Power Commission in 1954 authorized expenditure of $452 million and included 6,392 miles of pipeline. In 1953 authorizations totaled $726 million and included 6,800 miles of line.

One certificate to Pacific Northwest Pipeline Corp. covered a new transmission system to cost $160 million and to include 1,900 miles of pipeline. This line will originate in the San Juan Basin of New Mexico and will serve Washington and Oregon with natural-gas for the first time. It will also serve customers along the route in Colorado, Utah, Wyoming, and Idaho. The initial daily capacity is to be 377 million cubic feet.

The Colorado Interstate Gas Co. was authorized to construct a pipeline to Denver from a connection with Pacific Northwestern near Rock Springs, Wyo.

The Texas Eastern-Penn-Jersey Transmission Corp. was authorized to construct a line from the Oakford storage pool in Pennsylvania to a point near Lambertville, N. J., where it connects with the line of Texas Eastern Transmission Corp. The line will provide storage service for Transcontinental Gas Pipe Line Corp.

The other certificates issued were in general authorizations to tap new sources of supply and to deliver more gas to present customers.

CONSUMPTION

Consumption of natural gas in the United States increased at a slightly higher rate in 1954 than in 1953. In 1954 residential and commercial usage increased at a higher rate than in the previous year because of the colder weather in the fourth quarter. Industrial consumption did not increase as rapidly as in 1953 because of the preferential delivery to residential and commercial consumers and also because of the lower level of industrial activity in 1954.

The most rapid increases in the use of natural gas occurred in New England and the Southeastern States, where gas has only recently become available. Consumption declined in New Mexico and Oklahoma and increased slightly in Texas.

Residential and Commercial.—The more normal cold winter weather in 1954 after the unusually warm winter in 1953 was partly responsible for the large increases in residential and commercial consumption. Residential consumption was 12 percent greater than in 1953, whereas the number of residential consumers increased only 5 percent. The average consumption of natural gas per residential consumer in 1954 was 83,500 cubic feet. In 1953 it had declined to 79,400 cubic feet from 82,000 in 1952.

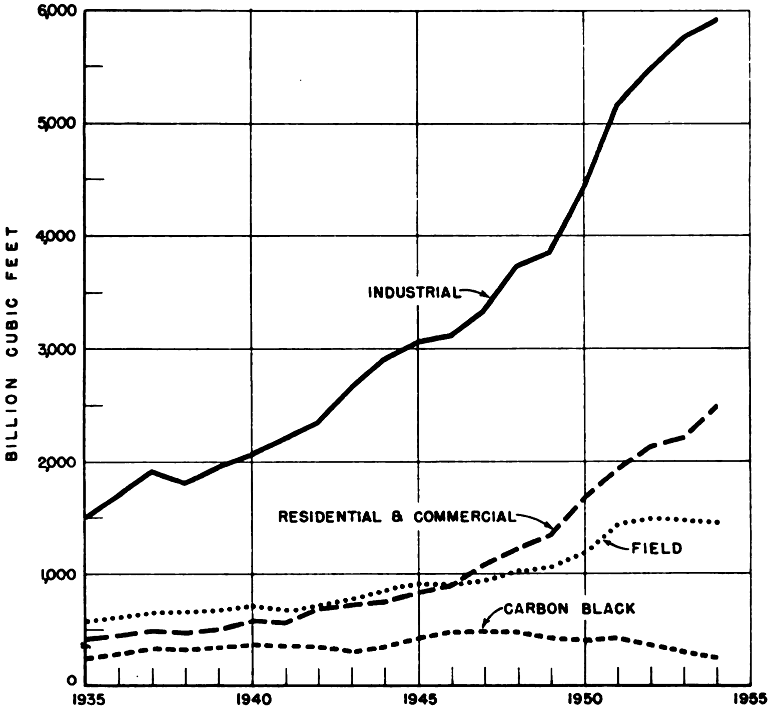

FIGURE 2.—Consumption of natural gas in the United States, 1935–54, by use.

Field.—Field use declined for the second consecutive year. The largest declines took place in Louisiana, New Mexico, and Oklahoma; use in Texas increased.

Processed for Natural-Gas Liquids.—The volume of natural gas processed for the extraction of natural-gas liquids increased 9 percent in 1954. The major increases were in Texas, New Mexico, Kentucky, and Illinois. The increases resulted from the construction of new plants and from plants erected in 1953 that operated a full year for the first time in 1954.

TABLE 8.—Consumption of natural gas in the United States, 1950–54, by States [1]

State	Quantity (million cubic feet)					Change from 1953 (percent)	Estimated value at points of consumption (thousand dollars)	
	1950	1951	1952	1953	1954		1953	1954
Alabama	92,466	111,030	125,874	136,825	139,551	2.0	43,290	48,884
Arizona	53,419	62,046	63,111	71,210	75,568	5.8	26,659	27,471
Arkansas	135,609	155,524	165,603	176,489	192,378	8.3	33,425	36,943
California	683,924	787,848	792,520	862,243	933,934	8.3	343,682	377,162
Colorado	88,692	102,769	101,835	115,922	126,048	8.7	35,317	42,103
Connecticut	----------	----------	1,039	5,833	11,415	95.7	13,756	25,756
Delaware	1,022	1,679	2,276	1,972	2,980	51.1	3,696	3,937
District of Columbia	10,694	11,904	12,782	13,134	14,261	8.6	17,406	18,749
Florida	12,348	13,044	16,001	19,577	23,159	18.3	3,903	4,816
Georgia	67,894	94,596	108,329	122,742	132,069	7.6	40,675	48,322
Illinois	235,211	250,812	344,705	350,980	391,408	11.5	176,035	213,394
Indiana	58,620	69,177	96,124	103,444	116,308	12,4	66,310	76,135
Iowa	66,233	79,640	94,951	106,755	119,876	12.3	41,766	52,413
Kansas	242,603	278,892	279,632	283,604	293,784	3.6	65,708	73,608
Kentucky	61,323	74,386	87,006	104,781	110,039	5.0	40,556	45,025
Louisiana	475,500	549,305	599,312	594,656	636,704	6.9	85,613	98,366
Maryland	13,813	22,286	26,468	29,470	35,010	18.8	36,298	43,353
Massachusetts	----------	1,783	11,386	17,683	35,486	100.7	40,379	64,218
Michigan	127,180	154,283	163,991	178,307	188,922	5.9	145,255	155,564
Minnesota	67,861	84,205	97,591	104,508	115,140	10.2	50,397	59,356
Mississippi	76,918	97,786	119,638	118,617	136,797	15.3	28,006	32,927
Missouri	140,384	156,922	168,992	173,674	188,349	8.4	77,779	87,821
Montana	38,544	37,481	40,771	39,934	40,624	1.7	13,145	15,135
Nebraska	61,742	72,386	78,544	83,384	93,189	10.5	34,533	39,953
Nevada	----------	----------	----------	----------	982	----------	----------	676
New Hampshire	----------	3	316	857	1,065	24.3	1,926	2,230
New Jersey	3,209	30,887	40,409	58,685	65,718	11.9	82,564	93,522
New Mexico	147,509	174.808	194,748	200,039	177,221	−11.4	25,955	25,858
New York	65,157	144,920	180.747	197,878	225,844	14.1	254,917	287,134
North Carolina	----------	1,631	2,945	6,172	9,436	52.9	4,574	7,000
North Dakota	3,279	3,408	3,342	3,559	4,820	35.5	2,043	2,392
Ohio	324,594	375,820	393,250	420,809	442,523	5.2	239,970	265,830
Oklahoma	286,793	307,887	319,908	333,972	327,936	−1.8	58,255	64,434
Pennsylvania	263,199	311,937	324,187	335,457	353,185	5.3	218,786	239,188
Rhode Island	----------	----------	----------	670	4,423	560.1	2,005	12,272
South Carolina	----------	853	2,896	8,772	16,573	88.9	3,605	10,632
South Dakota	10,001	11,447	11,701	13,688	15,564	57.8	6,434	7,424
Tennessee	67,813	88,078	99,817	106,130	114,869	8.2	39,936	46,539
Texas	1,824,553	2,130,377	2,175,100	2,194,172	2,198,175	0.2	283,468	296,345
Utah	26,368	29,014	30,929	34,592	41,073	18.7	13,455	16,236
Virginia	7,639	14,853	18,630	27,716	35,604	28.5	26,330	33.701
West Virginia	132,273	139,608	146,153	148,017	138,846	−6.2	52,035	49,829
Wisconsin	15,380	28,382	33,632	36,339	39,287	8.1	40,726	43,972
Wyoming	36,637	38,865	36,287	36,070	36,709	1.8	8,423	8,735
Total United States	6,026,405	7,102,562	7,613,478	7,979,338	8,402,852	5.3	2,828,996	3,205,355

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[1] Includes natural gas mixed with manufactured gas.

TABLE 9.—Residential and commercial consumption of natural gas in the United States in 1954, by States [1]

State	Residential				Commercial				Total			
	Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption		Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption		Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption	
			Total (thousand dollars)	Average (cents per M cubic feet)			Total (thousand dollars)	Average (cents per thousand feet)			Total (thousand dollars)	Average (cents per M cubic feet)
Alabama	299	23,545	20,463	86.9	23	7,879	4,356	55.3	322	31,424	24,819	79.8
Arizona and Nevada	176	9,675	9,543	98.6	23	6,426	3,205	49.9	199	16,101	12,748	79.2
Arkansas	215	19,805	11,054	55.8	30	11,655	4,524	38.8	245	31,460	15,578	49.5
California	3,375	233,060	172,127	73.9	279	86,694	50,551	58.3	3,654	319,754	222,678	69.6
Colorado	250	31,760	19,134	60.2	32	17,705	9,002	50.8	282	49,465	28,136	56.9
Connecticut	338	7,203	18,230	253.1	19	1,531	3,423	223.6	357	8,734	21,653	247.9
Delaware, District of Columbia and Maryland	639	35,740	50,281	140.7	49	7,416	9,546	128.7	688	43,156	59,827	138.6
Florida	19	1,671	1,387	83.0	41	333	104	31.2	60	2,004	1,491	74.4
Georgia	299	28,817	21,094	73.2	28	11,313	5,023	44.4	327	40,130	26,117	65.1
Illinois	1,821	115,878	119,270	102.9	101	23,372	18,907	80.9	1,922	139,250	138,177	99.2
Indiana	610	39,665	42,077	106.1	44	9,675	9,106	94.1	654	49,340	51,183	103.7
Iowa	314	30,723	24,609	80.1	33	12,742	7,097	55.7	347	43,465	31,706	72.9
Kansas	411	51,394	25,828	50.3	53	30.416	10,931	35.9	464	81,810	36,759	44.9
Kentucky	301	37,388	23,242	62.2	32	11,011	5,826	52.9	333	48,399	29,068	60.1
Louisiana	510	34,842	21,250	60.9	44	14,404	5,257	36.5	554	49,246	26,507	53.8
Massachusetts	913	20.719	47,898	231.2	52	4,465	9,537	213.6	965	25,184	57,435	228.1
Michigan	1,199	118,479	112,799	95.2	67	15,339	13,225	86.2	1,266	133,818	126,024	94.2
Minnesota	329	42,711	34,162	79.9	21	9,322	5,251	56.3	350	52,033	39,413	75.7
Mississippi	199	16,398	12,118	73.9	27	9,740	3,909	40.1	226	26,138	16,027	61.3
Missouri	648	72,796	52,132	71.6	32	20,056	10,810	53.9	680	92,852	62,942	67.8
Montana	81	13,387	7,886	58.9	9	8,323	3,452	41.5	90	21,710	11,338	52.2
Nebraska	213	26,651	19,696	73.9	25	12,467	6,030	48.4	238	39,118	25,726	65.8
New Hampshire	25	764	1,657	216.9	2	241	492	204.1	27	1,005	2,149	213.8
New Jersey	1,220	33,538	68,069	202.9	82	5,351	8,649	161.6	1,302	38,889	76,718	197.2
New Mexico	113	11,465	7,796	67.9	13	5,635	2,347	41.7	126	17,100	10,143	59.3
New York	3,452	141,729	209,044	147.5	287	28,693	43,060	150.1	3,739	170,422	252,104	147.9
North Carolina	44	1,908	3,300	172.9	7	1,059	1,635	154.4	51	2,967	4,935	166.3
North Dakota and South Dakota	48	6,352	4,818	75.9	6	4,618	2,363	51.2	54	10.970	7,181	65.4
Ohio	1,743	247,921	164,592	66.4	140	59,006	37,119	62.9	1,883	306.927	201,711	65.7
Oklahoma	471	45,079	27,297	60.6	54	22,788	8,554	37.5	525	67,867	35,851	52.8
Pennsylvania	1,794	157,706	145,046	91.9	117	31,565	21,064	66.7	1,911	189,271	166,110	87.8

Rhode Island	159	3,074	9,527	309.9	3	806	1,778	220.6	162	3,880	11,305	291.4
South Carolina	43	1,378	2,896	210.2	5	659	1,206	183.0	48	2,037	4,102	201.3
Tennessee	214	20,933	17,500	83.6	28	14,267	8.018	56.2	242	35,200	25,518	72.5
Texas	1,644	112,778	79,846	70.8	176	46,646	21,815	46.8	1,820	159,424	101,661	63.7
Utah	98	10,162	6.615	65.1	14	5,005	2,651	53.0	112	15,167	9,266	61.1
Virginia	258	13,947	21,217	152.1	20	5,276	5,428	102.9	278	19,223	26,645	138.6
West Virginia	295	42,804	21,865	51.1	28	12,076	5,663	46.9	323	54,880	27,528	50.2
Wisconsin	399	23,101	31,064	134.5	24	4,391	5,560	126.6	423	27,492	36,624	133.2
Wyominig	48	7,302	4,018	55.0	6	4,591	1,768	38.5	54	11,893	5,786	48.6
Total: 1954	25,227	1,894,248	1,692,447	89.3	2,076	584,957	378,242	64.7	27,303	2,479,205	2,070,689	83.5
1953	24,186	1,685,503	1,457,963	86.5	2,042	530,650	323,475	61.0	26,228	2,216,153	1,781,438	80.4

Includes natural gas mixed with manufactured gas.

TABLE 10.—Industrial consumption of natural gas in the United States in 1954 by States and uses

State	Field (drilling, pumping, and operating gasoline-recovery plants)		Carbon-black manufacture			Fuel							Total industrial			Fuel at electric utility plants[1] (million cubic feet)
				Value at point of consumption		Million cubic feet					Value at point of consumption			Value at point of consumption		
	Million cubic feet (estimated)	Value at point of consumption (thousand dollars)	Million cubic feet	Total (thousand dollars)	Average (cents per M cubic feet)	Petroleum refineries	Portland-cement plants	Natural-gas pipelines	Other industrial	Total	Total (thousand dollars)	Average (cents per M cubic feet)	Million cubic feet	Total (thousand dollars)	Average (cents per M cubic feet)	
Alabama	53	3	--------	--------	--------	(2)	13,522	6,358	[3] 88,194	108,074	24,062	22.3	108,127	24,065	22.3	21,847
Arizona	12	1	--------	--------	--------	--------	(2)	8,034	[3] 52,403	60,437	15,398	25.5	60,449	15,399	25.5	19,316
Arkansas	18,157	955	--------	--------	--------	10,837	(2)	9,327	[3] 122,597	142,761	20,410	14.3	160,918	21,365	13.3	47,146
California	160,979	21,860	(2)	(2)	(2)	59,514	23,728	7,175	[3] 362,784	[3] 453,201	132,624	29.3	614,180	154,484	25.2	178,751
Colorado	8,686	471	--------	--------	--------	1,546	(2)	663	[3] 65,688	67,897	13,496	19.9	76,583	13,967	18.2	33,918
Connecticut	--------	--------	--------	--------	--------	--------	--------	21	2,660	2,681	4,103	153.0	2,681	4,103	153.0	--------
Delaware, District of Columbia, and Maryland	37	16	--------	--------	--------	--------	--------	902	8,156	9,058	6,196	68.4	9,095	6,212	68.3	1,057
Florida	35	4	--------	--------	--------	--------	--------	--------	21,120	21,120	3,321	15.7	21,155	3,325	15.7	8,376
Georgia	--------	--------	--------	--------	--------	--------	(2)	2,999	[3] 88,940	91,939	22,205	24.2	91,939	22,205	24.2	43,272
Illinois	12,476	1,313	--------	--------	--------	8,920	--------	10,159	220,603	239,682	73,904	30.8	252,158	75,217	29.8	72,218
Indiana	195	10	--------	--------	--------	4,629	(2)	4,239	[3] 57,905	66,773	24,942	37.4	66,968	24,952	37.3	4,343
Iowa	--------	--------	--------	--------	--------	--------	8,438	6,222	61,751	76,411	20,707	27.1	76,411	20,707	27.1	39,495
Kansas	21,583	2,614	(2)	(2)	(2)	13,241	10,703	31,335	[3] 135,112	[3] 190,391	34,235	18.0	211,974	36,849	17.4	59,663
Kentucky	11,566	1,542	--------	--------	--------	(2)	--------	8,912	[3] 41,162	50,074	14,415	28.8	61,640	15,957	25.9	9,203
Louisiana	144,052	10,419	25,081	1,725	6.5	96,702	(2)	16,250	[3] 305,373	418,325	59,715	14.3	587,458	71,859	12.2	69,662
Massachusetts	--------	--------	--------	--------	--------	--------	--------	60	10,242	10,302	6,783	65.8	10,302	6,783	65.8	5,936
Michigan	1,877	359	--------	--------	--------	294	--------	2,150	50,783	53,227	29,181	54.8	55,104	29,540	53.6	425
Minnesota	--------	--------	--------	--------	--------	--------	--------	178	62,929	63,107	19,943	31.6	63,107	19,943	31.6	30,398
Mississippi	15,770	1,470	--------	--------	--------	(2)	(2)	16,050	[3] 78,839	94,889	15,430	16.3	110,659	16,900	15.3	37,169
Missouri	20	3	--------	--------	--------	(2)	6,889	7,546	[3] 81,042	95,477	24,876	26.1	95,497	24,879	26.1	24,835
Montana	2,895	295	--------	--------	--------	2,363	(2)	424	[3] 13,232	16,019	3,502	21.9	18,914	3,797	20.1	604
Nebraska	895	110	--------	--------	--------	(2)	(2)	4,107	[3] 49,069	53,176	14,117	26.5	54,071	14,227	26.3	22,533
New Hampshire	--------	--------	--------	--------	--------	--------	--------	--------	60	60	81	135.0	60	81	135.0	--------
New Jersey	--------	--------	--------	--------	--------	--------	--------	14	26,815	26,829	16,804	62.6	26,829	16,804	62.6	15,293
New Mexico	62,213	4,523	54,514	3,430	6.3	1,272	--------	6,629	35,493	43,394	7,757	17.9	160,121	15,710	9.8	20,659
New York	459	197	--------	--------	--------	16	--------	635	54,312	54,963	34,833	63.4	55,422	35,030	63.2	29,748
North Carolina	--------	--------	--------	--------	--------	--------	--------	2,098	4,371	6,469	2,065	31.9	6,469	2,065	31.9	--------
North Dakota and South Dakota	789	52	--------	--------	--------	(2)	(2)	35	[3] 8,590	8,625	2,583	29.9	9,414	2,635	27.9	4,530

Ohio	1,378	404	--------	--------	------	234	(3)	3,429	[3]130,555	134,218	63,715	47.5	135,596	64,119	47.8	2,127
Oklahoma	140,427	9,366	--------	--------	------	40,270	(3)	7.215	72,157	119,642	19,217	16.1	260,069	28,583	10.9	62,825
Pennsylvania	2,905	1,124	--------	--------	------	12,975	--------	7,491	140,543	161,009	71,954	44.7	163,914	73,078	44.6	15,465
Rhode Island	--------	--------	--------	--------	------	(3)	--------	36	[3]507	543	967	178.1	543	967	178.1	5
South Carolina	--------	--------	--------	--------	------	--------	--------	1,105	13,431	14,536	6,530	44.9	14,536	6,530	44.9	10,877
Tennessee	409	367	--------	--------	------	(3)	--------	7,716	[3]71,544	79,260	20,654	26.1	79,669	21,021	26.4	8,176
Texas	806,677	55,661	161,062	10,873	6.8	298,829	28,387	40,439	703,357	1,071,012	128,150	12.0	2,038,751	194,684	9.5	257,151
Utah	249	22	--------	--------	------	400	(3)	53	[3]25,204	25,657	6,948	27.1	25,906	6,970	26.9	6,273
Virginia	49	13	--------	--------	------	--------	--------	2,164	14,168	16,332	7,043	43.1	16,381	7,056	43.1	676
West Virginia	26,132	5,954	--------	--------	------	1,316	--------	6,955	49,563	57,834	16,347	28.3	83,966	22,301	26.6	647
Wisconsin	--------	--------	--------	--------	------	--------	--------	419	11,376	11,795	7,348	62.2	11,795	7,348	62.3	204
Wyoming	15,908	1,540	--------	--------	------	4,694	--------	1,071	3,143	8,908	1,409	15.8	24,816	2,949	11.9	675
Unclassified by States	--------	--------	[3]10,519	[3]1,482	[3]14.1	[3]5,263	[3]33,590	--------	(3)	--------	--------	------	--------	--------	------	--------
Total: 1954	1,456,883	120,668	251,176	17,510	6.9	563,315	125,257	230,615	[4]3,296,401	[4]4,215,588	[4]996,488	[4]23.6	5,923,647	1,134,666	19.2	1,165,498
1953	1,471,085	124,338	300,942	17,668	5.9	558,695	115,039	230,314	3,087,110	3,991,158	905,552	22.7	5,763,185	1,047,558	18.2	1,034,272

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[1] Federal Power Commission. These figures include some manufactured gas and are therefore shown separately. The natural-gas component in these figures is included with "Other industrial."

[2] Gas used in petroleum refineries and/or portland-cement plants included under Unclassified by States" for United States total and under "Other industrial" for State totals to avoid disclosing figures of individual operators.

[3] Gas used in carbon-black manufacture included under "Unclassified by States" for United States total and under "Other industrial" for State totals to avoid disclosing figures of individual operators.

[4] Total does not include undisclosed figures.

TABLE 11.—Natural gas processed at natural-gasoline and cycle plants in the United States, 1950–54, by States, in million cubic feet

State	1950	1951	1952	1953	1954
Arkansas	64, 237	71, 145	77, 317	71, 257	64, 561
California	509, 796	553, 821	523, 115	580, 191	571, 702
Colorado	7, 785	11, 739	(1)	(2)	[3] 36, 159
Illinois	13, 333	11, 856	[4] 12, 317	[4, 5] 73, 157	[5, 6] 159, 226
Kansas	361, 744	397, 294	403, 376	[7] 431, 998	[8] 400, 790
Kentucky	47, 660	86, 950	268, 096	[5] 277, 145	[5] 369, 926
Louisiana	534, 550	598, 420	607, 564	591, 626	627, 006
Michigan	1, 173	382	(4)	(4)	(4)
Mississippi	45, 145	46, 468	53, 050	135, 935	120, 534
Montana	15, 017	17, 000	(1)	(2)	(3)
Nebraska	------------	2, 662	(1)	(7)	(8)
New Mexico	185, 138	242, 759	279, 286	324, 721	439, 557
New York	13	20	------------	------------	------------
Ohio	20, 764	23, 837	9, 011	(9)	(6)
Oklahoma	332, 764	419, 868	444, 425	476, 094	539, 582
Pennsylvania	41, 406	37, 386	32, 235	[9] 20, 935	20, 201
Texas	2, 938, 158	3, 406, 670	3, 420, 398	3, 619, 335	3, 843, 718
Utah	------------	------------	(1)	(2)	(3)
West Virginia	183, 957	229, 654	215, 485	160, 170	205, 151
Wyoming	39, 164	45, 139	46, 848	[2] 74, 718	60, 372
Other States	------------	------------	26, 074	------------	------------
Total	5, 341, 804	6, 203, 070	6, 418, 597	6, 837, 282	7, 458, 485

[1] Colorado, Montana, Nebraska, and Utah combined under "Other States" to avoid disclosure of individual State data.

[2] Colorado, Montana, and Utah included in Wyoming.

[3] Montana and Utah included in Colorado.

[4] Michigan included in Illinois.

[5] Includes gas from transmission lines previously treated in another State.

[6] Michigan and Ohio included in Illinois.

[7] Nebraska included in Kansas.

[8] Nebraska and North Dakota included in Kansas.

[9] Ohio included in Pennsylvania.

Carbon Black.—The use of gas for the production of carbon black declined again in 1954, as did the production of carbon black. Even with less gas consumption carbon-black production in 1954 was three times the quantity produced in 1936.

Petroleum Refineries.—The use of natural gas at petroleum refineries continued to increase in the larger gas-producing States in 1954. In California consumption declined 27 percent.

Electric Utility Plants.—The consumption of gas by electric utility plants continued upward and increased 13 percent in 1954. The increase in California was outstanding, in that electric plants in that State consumed 61 billion cubic feet more than in 1953.

Portland Cement.—The use of natural gas as fuel at portland-cement plants increased 9 percent. Natural gas was used at portland-cement plants in Ohio and South Dakota for the first time in 1954.

Natural-Gas Pipelines.—The quantity of gas used in operating natural-gas pipelines in 1954 remained substantially the same as in 1953. The trend was mainly upward in most States, with the notable exception of Oklahoma and Texas.

Other Industrial.—In 1954, "Other Industrial" use increased 8 percent, compared with an 11 percent increase in 1953 because of the necessity of diverting gas to residential users and slackening in industrial activity.

Mixed Gas.—The number of consumers of mixed gas remained substantially the same as in 1953. The quantity of natural gas consumed in mixed gas increased, because 1954 was the first full year in which natural gas was available to some New England utility companies and because colder weather prevailed.

TABLE 12.—Consumption of natural gas used with manufactured gas in the United States in 1954, by States [1]

State	Residential		Commercial		Industrial	Total	
	Number of consumers (thousand)	Quantity (million cubic feet)	Number of consumers (thousand)	Quantity (million cubic feet)	Quantity (million cubic feet)	Quantity (million cubic feet)	Value at point of consumption (thousand dollars)
Connecticut	145	2,183	8	454	608	3,245	7,475
Delaware and Maryland	(3)	538	(3)	98	75	711	1,338
Illinois	919	43,876	42	10,575	22,324	76,775	68,317
Indiana	312	13,113	20	3,267	26,454	42,834	32,151
Massachusetts	294	3,955	23	1,541	335	5,831	15,600
New Jersey	936	25,441	65	3,678	5,418	34,537	58,634
New York	1,293	56,486	136	9,600	6,227	72,313	89,957
Pennsylvania	891	42,991	51	4,765	7,210	54,966	72,302
Tennessee	1	7	(3)	6	---------	13	9
Virginia	1	2	(3)	5	---------	7	8
Total: 1954	4,792	188,592	345	33,989	68,651	291,232	345,791
1953	4,862	151,968	361	29,532	64,439	245,939	285,429

Included in tables for the consumption of natural gas (tables 8–11).

[2] Converted to natural gas before the end of the year.

[3] Less than 500.

VALUE AND PRICE

The increase in the average value of natural-gas at the wellhead was less than in 1953, but the increase was far above the average for the postwar period 1946–52. In 1954 of the five largest producing States, only Oklahoma reported an increase in average value that was considerably less than the national average. The average values of residential, commercial, and industrial gas at point of consumption all

TABLE 13.—Average value of natural gas in the United States, 1953–54, by States, in cents per thousand cubic feet

State	At wells (estimated)		At point of consumption		State	At wells (estimated)		At point of consumption	
	1953	1954	1953	1954		1953	1954	1953	1954
Alabama	5.0	6.0	31.6	35.0	Nevada	------	------	--------	68.8
Arizona	------	------	37.4	36.4	Nebraska	13.5	11.7	41.4	42.9
Arkansas	5.3	5.5	18.9	19.2	New Hampshire	------	------	224.7	209.4
California	19.7	20.6	39.9	40.4	New Jersey	------	------	140.7	142.3
Colorado	5.8	8.7	30.5	33.4	New Mexico	6.1	7.8	13.0	14.6
Connecticut	------	------	235.8	225.6	New York	31.6	32.6	128.8	127.1
Delaware	------	------	187.4	132.1	North Carolina	------	------	74.1	74.2
District of Columbia	------	------	132.5	130.4	North Dakota	6.8	6.3	57.4	49.6
Florida	6.8	8.3	19.9	20.8	Ohio	22.2	21.2	57.0	60.1
Georgia	------	------	33.1	36.6	Oklahoma	6.9	7.0	17.4	19.6
Illinois	16.8	14.2	50.2	54.5	Pennsylvania	29.1	29.9	65.2	67.7
Indiana	7.0	6.0	64.1	65.5	Rhode Island	------	------	299.2	277.5
Iowa	------	------	39.1	43.7	South Carolina	------	------	41.1	64.2
Kansas	8.6	10.6	23.2	25.1	South Dakota	5.0	5.0	47.0	47.7
Kentucky	21.9	22.8	42.8	40.9	Tennessee	12.0	11.5	37.6	40.5
Louisiana	8.2	8.9	14.4	15.4	Texas	7.6	8.5	12.9	13.5
Maryland	19.0	20.2	123.2	128.9	Utah	11.4	14.1	39.9	39.5
Massachusetts	------	------	228.3	180.9	Virginia	25.8	27.1	95.0	94.7
Michigan	16.4	17.8	81.5	82.3	West Virginia	23.6	23.8	35.2	35.9
Minnesota	------	------	48.2	51.6	Wisconsin	------	------	112.1	111.9
Mississippi	8.0	8.3	23.6	24.1	Wyoming	7.9	8.4	23.4	23.8
Missouri	20.0	18.8	44.8	46.6					
Montana	5.9	6.8	32.9	37.5	Total	9.2	10.1	35.5	38.1

increased in 1954 but at a slower rate than in the three previous years. The overall average value at point of consumption increased at a higher rate than in 1953 because of the larger proportion of residential sales in 1954. Increases were general, except for the New England States.

TECHNOLOGY

In 1954 two significant techniques for drilling and completing gas wells were quite extensively adopted. One was the use of air or natural gas instead of mud as a drilling fluid to prevent clogging of the gas-producing strata by mud. The other technique was to fracture the producing strata by forcing sand suspended in a liquid into the formation.

WORLD REVIEW

Canada.—The estimated gross production of natural gas, less field waste, was 120.9 billion cubic feet, a 20-percent increase over 1953. Reserves totaled at least 16 trillion cubic feet.

Mexico.—The production of natural gas in Mexico remained substantially unchanged in 1954 at 93 billion cubic feet.

Italy.—The production of natural gas in Italy in 1954 totaled 104.8 billion cubic feet compared with 81.1 billion in 1953.

Venezuela.—The gross production of natural gas in Venezuela was 764 billion cubic feet compared with 730 billion in 1953. Of this total, only 24 billion cubic feet was sold away from the field.

TABLE 14.—Consumption of natural gas, 1948–53, by countries, in million cubic meters

[United Nations Statistical Yearbook]

Country	1948	1949	1950	1951	1952	1953
Western Hemisphere:						
Argentina	606	664	799	(1)	(1)	(1)
Canada	1,659	1,712	1,921	2,250	2,511	2,821
Chile	672	969	1,108	1,359	1,456	1,564
Ecuador	106	109	132	152	(1)	(1)
Mexico [2]	1,088	1,222	1,266	1,411	1,532	(1)
Trinidad	465	489	475	471	478	501
United States	145,776	153,471	177,860	211,170	226,917	237,775
Venezuela	(1)	(1)	(1)	(1)	1,756	2,169
Europe:						
Austria [3]	52	54	50	49	49	56
France	174	228	246	282	266	244
Germany [4]	67	54	68	84	96	104
Italy	117	249	510	966	1,443	2,298
Yugoslavia	9	8	15	13	14	73
Asia:						
Brunei [5]	562	580	754	1,039	1,094	1,173
China	28	25	41	30	28	31
Indonesia	369	591	621	785	1,069	1,366
Japan	51	58	69	83	91	111
Total	(1)	(1)	(1)	(1)	(1)	(1)

[1] Data not available.
[2] Including gas repressured and gas delivered to absorption plants.
[3] Vienna only.
[4] Beginning 1948, West Germany. Figures represent virtually total German production.
[5] Total production including gas repressured and wasted.

Natural-Gas Liquids

By D. S. Colby, L. V. Harvey, A. T. Coumbe, and I. F. Avery

GENERAL SUMMARY

THE PRODUCTION of natural-gas liquids in 1954 increased 6 percent to 10.6 billion gallons. Production of liquefied petroleum (LP-) gases was 13 percent ahead of 1953. Shipments of LP-gases for both motor fuel blending and for fuel and chemical use were 12 and 11 percent, respectively, above 1953. Stocks of natural-gas liquids at plants, terminals, and refineries increased 152 million gallons during the year. Of this, 137 million gallons was an increase in stocks of LP-gases stored underground.

Sales of LP-gases, including liquefied refinery (LR-) gases, for all uses other than blending in gasoline increased 4 percent in 1954.

SCOPE OF REPORT

Annual statistics on natural-gas liquids were collected jointly by the Bureau of Mines (United States Department of the Interior) and the Bureau of the Census (United States Department of Commerce) for the Census year 1954. This joint collection covered production, value, volume of gas processed, and number and type of plants.

The monthly reports received by the Bureau of Mines provided data on individual products, on stocks, and on uses.

Data on sales of LP-gases for fuel and chemical uses include propane, propylene, butanes, and butylenes produced both at natural-gasoline plants and at petroleum refineries but do not include liquefied-petroleum gas that is blended into gasoline motor fuel. Information is collected on an annual questionnaire received from all producers and distributors and from 90 percent of the dealers selling over 100,000 gallons of LP-gases a year. Data on small or nonreporting dealers are indirectly included in the reporting, as the sales figures of producers or distributors will reflect the operations of these dealers.

RESERVES

The American Gas Association Reserves Committee estimated the proved recoverable reserves of natural-gas liquids on December 31, 1954, at 5.2 billion barrels. This was a decline of 0.2 billion barrels for the year and the first decline since the committee started estimating reserves in 1946. This decline in 1954 was due primarily to downward revision of reserves in Texas, which were overestimated in 1953. Extensions and revisions in New Mexico were also considerably lower than in 1953.

TABLE 1.—Salient statistics of the natural-gas-liquids industry in the United States, 1950–54, in thousand gallons

	1950	1951	1952	1953	1954
Production:					
Natural gasoline and natural-gasoline mixtures	3,228,666	3,522,960	3,665,760	3,858,918	[1] 4,104,828
LP-gases	3,035,844	3,627,834	4,285,386	4,692,870	5,204,304
Finished gasoline and naphtha	881,202	968,016	900,312	904,176	733,068
Other products	496,650	480,858	536,172	564,354	547,386
Total	7,642,362	8,599,668	9,387,630	10,020,318	10,589,586
Receipts from outside sources (refineries)	72,534	67,200	83,916	98,826	(2)
Shipments for use in gasoline:					
To refineries and jobbers	5,041,848	5,441,394	5,943,630	6,014,070	[2] 6,134,771
Exports	51,114	85,218	(3)	(3)	(2)
Losses	62,286	46,158	(3)	(3)	(2)
Transfers to nongasoline uses:					
LP-gases	2,428,734	2,931,642	[4] 3,347,736	[4] 3,717,504	[4][5] 4,132,536
Other products	122,934	143,262	172,620	177,912	200,427
Stock at plants, terminals, and refineries:					
Natural gasoline	175,854	206,178	153,888	187,236	171,671
LP-gases	69,762	64,974	107,142	171,150	308,528
Other products	63,294	72,660	66,864	79,590	109,407
Total	308,910	343,812	327,894	437,976	589,606
Value of natural-gas liquids at plants thousand dollars	419,605	508,161	533,160	597,840	581,412
Average value per gallon cents	5.5	5.9	5.7	6.0	5.5
Natural gas processed million cubic feet	5,341,804	6,203,070	6,418,597	6,837,282	7,459,918
Average yield, all light products gallons per M cubic feet	1.43	1.39	1.46	1.47	1.42
Sales to consumers for fuel and chemical uses:					
LP-gases	2,421,006	2,904,384	3,215,184	3,590,067	3,785,781
LR-gases	1,061,550	1,322,874	1,262,184	1,341,942	1,339,752
Total	3,482,556	4,227,258	4,477,368	4,932,009	5,125,533
Exports of natural gasoline, LP-gases, and LR-gases	109,704	156,156	[6] 168,402	164,557	189,216

[1] Includes isopentane; isopentane included in LP-gases in previous years.

[2] "Receipts from outside sources" has been eliminated from supply and shipments.

[3] Natural-gasoline exports included in "Shipments for use in gasoline: To refineries and jobbers."

[4] Includes ethane. Ethane is excluded from "Sales to consumers for fuel and chemical uses."

[5] Includes LP-gas exports.

[6] Revised figure.

TABLE 2.—Estimated proved recoverable reserves of natural-gas liquids [1] in the United States, 1953–54, in thousand barrels

[Committee on Natural Gas Reserves, American Gas Association]

State	Reserves as of Dec. 31, 1953	Changes in reserves during 1954			Reserves as of Dec. 31, 1954			
		Extensions and revisions	Discoveries of new fields and new pools in old fields	Net production	Nonassociated with oil	Associated with oil	Dissolved in oil	Total
Arkansas	49,585	−798	45	1,913	19,141	14,080	13,698	46,919
California [2]	324,866	33,848	2,350	30,815	---------	104,137	226,112	330,249
Colorado	10,689	2,718	13	673	2,367	209	10,171	12,747
Illinois	17,043	8,464	405	3,692	47	13	22,160	22,220
Indiana	145	37	2	33	14	11	126	151
Kansas	177,728	285	2,448	5,264	169,713	2,060	3,424	175,197
Kentucky	7,776	5,304	152	2,492	[3] 10,740	--------	---------	10,740
Louisiana [2]	813,214	86,925	19,220	35,313	707,436	127,908	48,702	884,046
Michigan	641	271	79	78	156	100	657	913
Mississippi	54,734	7,470	942	2,726	33,528	21,346	5,546	60,420
Montana	2,908	4,571	---------	300	33	--------	7,146	7,179
Nebraska	3,034	−726	83	123	1,542	391	335	2,268
New Mexico	320.657	28,904	3,576	13,146	223,966	26,472	89,553	339,991
Ohio	1,359	90	9	19	[3] 1,439	--------	---------	1,439
Oklahoma	304,232	51,375	6,628	28,324	110,825	38,226	184,860	333,911
Pennsylvania	2,768	156	78	133	[3] 2,869	--------	---------	2,869
Texas [2]	3,267,242	−220,506	49,924	168,523	1,313.119	420,926	1,194,092	2,928,137
Utah	53	−2	---------	4	47	--------	---------	47
West Virginia	28,213	10,635	212	5,066	[3] 33,994	--------	---------	33,994
Wyoming	50,559	1,809	354	2,036	17,623	1,117	31,946	50,686
Alabama, Florida, and North Dakota	476	---------	---------	142	---------	--------	334	334
Total	5,437,922	20,830	86,520	300,815	2,648,599	756,996	1,838,862	5,244,457

[1] Comprises natural gasoline, LP-gases, and condensate.
[2] Includes offshore reserves.
[3] Not allocated by types, but occurring principally in column shown.

PRODUCTION

The production of natural-gas liquids increased 6 percent in 1954 compared to 7 percent in 1953. LP-gas production continued to show the highest rate of growth of the various natural-gas liquids. In 1954 it increased 13 percent. Finished-gasoline production declined 19 percent, mostly in Texas.

Beginning with 1954 statistics, isopentane has been shifted from the LP-gas category and is included with natural gasoline.

Regionally, there were production increases in the same areas as in 1953. The National Petrochemical Co. plant in Illinois operated its first full year in 1954; moreover, the new plant capacity of El Paso Natural Gas Co. in the San Juan Basin area of New Mexico operated its first full year. North Dakota began producing natural-gas liquids with completion of a plant at Tioga.

TABLE 3.—Natural-gas liquids produced and natural gas processed in the United States, 1954, by States

State	Number of operators [3]	Production										Natural gas processed		
		Natural gasoline [1]		LP-gases		Finished gasoline and naphtha		Other products [2]		Total		Million cubic feet	Average yield (gallons per M cubic feet)	
		Thousand gallons	Thousand dollars	Thousand gallons	Thousand dollars	Thousand gallons	Thousand dollars	Thousand gallons	Thousand dollars	Thousand gallons	Thousand dollars		Natural gas liquids except LP-gases	All natural gas liquids
Arkansas	9	48,132	3,048	58,506	2,521	--------	--------	2,646	186	109,284	5,755	64,561	0.79	1.69
California	27	835,338	81,744	396,186	22,262	--------	--------	87,822	7,549	1,319,346	111,555	571,702	1.61	2.31
Colorado, Montana, and Utah	6	21,840	1,435	21,576	1,131	--------	--------	--------	--------	43,416	2,566	36,169	.60	1.20
Illinois, Michigan, and Ohio	10	31,290	2,399	278,996	10,230	--------	--------	84	6	310,370	12,635	[4] 159,225	.20	1.95
Kansas, Nebraska, and North Dakota	14	109,242	5,540	97,818	3,261	--------	--------	--------	--------	207,060	8,801	400,791	.27	.52
Kentucky	4	28,224	1,552	189,966	5,066	--------	--------	--------	--------	218,190	6,618	[4] 370,111	.08	.59
Louisiana	29	244,272	16,401	292,226	11,620	241,416	23,279	179,382	14,650	957,296	65,950	627,006	1.06	1.53
Mississippi	2	[5] 25,998	1,820	15,288	528	--------	--------	1,806	124	43,092	2,472	120,533	.23	.36
New Mexico	11	223,734	11,719	225,994	5,704	--------	--------	378	25	450,106	17,448	439,556	.51	1.02
Oklahoma	40	474,390	23,945	453,810	13,506	2,940	300	1,260	87	932,400	37,838	540,822	.89	1.73
Pennsylvania	7	4,830	320	1,008	89	--------	--------	--------	--------	5,838	409	20,201	.24	.29
Texas	112	1,974,210	141,955	2,983,962	95,913	487,956	39,966	269,934	18,638	5,716,062	296,472	3,843,718	.71	1.49
West Virginia	9	40,152	2,486	142,884	5,035	756	97	168	10	183,960	7,628	205,151	.20	.90
Wyoming	6	43,176	2,848	46,084	2,128	--------	--------	3,906	289	93,166	5,265	60,372	.78	1.54
Total	219	4,104,828	297,212	5,204,304	178,994	733,068	63,642	547,386	41,564	10,589,586	581,412	7,459,918	.72	1.42

[1] Includes isopentane.
[2] Includes condensate, kerosine, distillate fuel, and other heavy oils produced at natural-gasoline plants.
[3] A producer operating in more than 1 State is counted but once in arriving at total for United States.
[4] Includes gas from transmission lines, previously treated in another State.
[5] Includes drip gasoline.

TABLE 4.—Monthly production of natural-gas liquids in the United States, 1954, by States and districts,[1] in thousand gallons

State and district	January	February	March	April	May	June	July	August	September	October	November	December	Total
West Pennsylvania	669	658	698	544	447	336	327	349	353	384	446	627	5,838
West Virginia	25,017	20,493	17,868	12,608	12,013	11,907	13,715	14,444	14,921	15,165	13,526	12,283	183,960
Illinois, Michigan, and Ohio	24,400	20,870	23,090	23,011	29,003	29,995	25,398	26,841	27,308	24,230	29,739	26,485	310,370
Kentucky	18,440	16,541	17,765	17,955	18,767	17,233	17,385	17,958	17,795	19,095	20,068	19,188	218,190
Kansas, Nebraska, and North Dakota	22,951	25,208	18,865	15,853	14,880	12,875	9,742	10,923	13,148	17,596	20,871	24,148	207,060
Oklahoma	86,168	79,682	78,663	73,085	74,294	69,660	70,040	76,644	76,316	79,714	81,366	86,768	932,400
Texas:													
Gulf	110,548	103,092	113,554	103,247	108,887	104,996	105,366	107,025	106,698	113,340	110,578	121,279	1,308,610
East Texas	37,465	32,047	40,793	42,430	41,408	42,272	39,941	30,640	34,579	33,633	34,219	33,969	443,396
Panhandle	66,422	61,447	68,004	63,104	67,329	58,469	51,160	57,515	60,045	65,491	67,394	68,896	755,276
West Texas	133,104	129,671	139,465	134,165	132,540	138,317	144,885	134,156	145,449	148,299	148,852	155,009	1,683,912
Rest of State	131,876	117,053	129,275	118,795	125,777	120,105	124,682	125,332	124,228	132,196	134,202	141,347	1,524,868
Total Texas	479,415	443,310	491,091	461,741	475,941	464,159	466,034	454,668	470,999	492,959	495,245	520,500	5,716,062
Arkansas	9,744	8,872	9,576	9,164	8,830	8,963	9,383	9,438	8,311	8,401	9,091	9,511	109,284
Louisiana:													
Gulf	36,595	32,749	37,171	34,432	33,335	32,799	33,655	34,044	33,274	34,869	33,965	36,224	413,112
Inland	44,401	48,981	46,217	42,723	44,161	41,601	40,597	39,384	42,970	47,747	48,010	57,392	544,184
Total Louisiana	80,996	81,730	83,388	77,155	77,496	74,400	74,252	73,428	76,244	82,616	81,975	93,616	957,296
Mississippi	4,096	3,636	3,906	3,594	3,734	3,183	3,357	3,414	3,402	3,590	3,517	3,663	43,092
New Mexico	30,620	29,782	34,414	33,113	34,159	35,442	39,646	41,638	38,240	45,415	44,826	42,811	450,106
Colorado, Montana, and Utah	3,206	2,647	3,072	3,787	4,364	3,493	3,099	3,003	3,511	4,084	4,496	4,654	43,416
Wyoming	7,918	6,836	6,916	7,085	7,010	6,989	7,439	8,521	8,233	8,712	8,635	8,872	93,166
California	116,366	102,557	112,986	107,473	107,975	105,732	109,476	108,593	106,548	113,290	111,698	116,652	1,319,346
Total United States	910,006	842,822	902,298	846,168	868,913	844,367	849,293	849,862	865,329	915,251	925,499	969,778	10,589,586
Daily average	29,355	30,101	29,106	28,206	28,029	28,146	27,397	27,415	28,844	29,524	30,850	31,283	29,013

[1] West Pennsylvania separated from east part of State to allow grouping either in a Bureau of Mines refinery district or Petroleum Administration for War district. Districts shown for Texas and Louisiana are Bureau of Mines production districts.

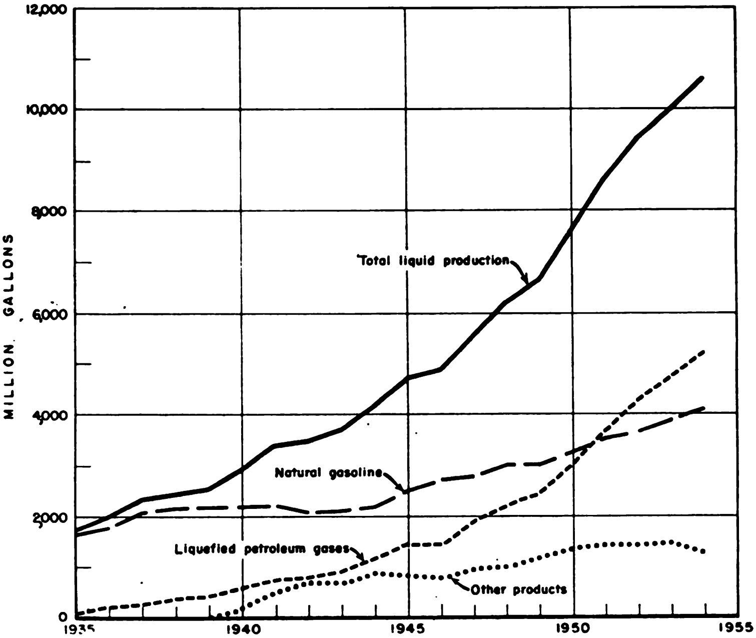

FIGURE 1.—Production of the natural-gas-liquids industry in the United States, 1935–54

TABLE 5.—Natural-gas liquids produced in the United States in 1954, by States and by methods of manufacture

State	Number of plants operating at end of year				Production (thousand gallons)			
	Compression[1]	Absorption[2]	Cycling[3]	Total	Compression	Absorption	Cycling	Total
Arkansas	----------	8	1	9	----------	(4)	(4)	109,284
California	2	73	2	77	23,184	1,109,304	186,858	1,319,346
Colorado[5]	1	4	----------	5	(4)	(4)	----------	[6] 43,416
Illinois[7]	4	8	----------	12	3,060	307,310	----------	310,370
Kansas[8]	1	15	----------	16	(4)	(4)	----------	207,060
Kentucky	3	3	----------	6	161,070	57,120	----------	218,190
Louisiana	2	40	8	50	4,403	466,965	485,928	957,296
Mississippi	----------	2	1	3	----------	(4)	(4)	43,092
New Mexico	1	17	----------	18	(4)	(4)	----------	450,106
Oklahoma	7	63	2	72	29,787	767,327	135,286	932,400
Pennsylvania	5	6	----------	11	479	5,359	----------	5,838
Texas	24	177	28	229	183,887	4,380,277	1,151,898	5,716,062
West Virginia	29	10	----------	39	97,777	86,183	----------	183,960
Wyoming	1	7	----------	8	(4)	(4)	----------	93,166
Total: 1954	80	433	42	555	515,980	8,059,708	2,013,898	10,589,586
1953	66	410	45	521	[9] 383,838	[9] 7,494,942	2,141,538	10,020,318

[1] Includes 27 plants manufacturing LP-gases; 1 refrigeration-type plant each in California, Kansas, and Kentucky; and 10 refrigeration-type plants in Texas.

[2] Includes combination of absorption with compression process. Includes 348 plants manufacturing LP-gases and 1 charcoal-type plant each in Ohio and West Virginia.

[3] Includes 40 plants manufacturing LP-gases.

[4] Included in State total production and United States total production to avoid disclosure of individual plant operation.

[5] Montana, with 1 absorption plant, and Utah, with production of a small amount of drip gasoline, included with Colorado.

[6] Includes some drip gasoline.

[7] Michigan, with 2 compression plants and 1 absorption plant, and Ohio, with 2 absorption plants. included with Illinois.

[8] Nebraska, with 1 absorption plant, and North Dakota, with 1 absorption plant, included with Kansas.

[9] Revised.

YIELDS, PROCESSES, AND NUMBER OF PLANTS

The overall yield of natural-gas liquids recovered declined from 1.47 gallons per thousand cubic feet of gas processed in 1953 to 1.42 gallons in 1954. The reduction was entirely in the yield of heavy products; the yield of LP-gases increased 0.01 gallon to 0.70 gallon per thousand cubic feet.

Yields dropped sharply in Illinois and Kentucky, where plants were operating on lean pipeline gas. Declines, however, were general throughout the producing States.

The number of plants operating at the end of 1954 totaled 555. The number of cycling plants and the production at cycling plants was less than in 1953. The number of compression and absorption plants and the quantity of liquids produced by them increased in 1954.

SHIPMENTS OF NATURAL-GAS LIQUIDS FROM PLANTS AND TERMINALS

Shipments of natural-gas liquids from plants and terminals in 1954 increased 5 percent compared with a 6-percent increase in 1953. Demand for both natural gasoline and LP-gases was higher than during the previous year, whereas demand for finished gasoline and condensate was lower.

For Motor-Fuel Use.—Total natural-gas liquids shipped for blending into motor fuel in 1954 was only 0.5 percent higher than in 1953. Production of motor fuel was less than 1 percent above the 1953 figure. The quantity of natural-gas liquids blended at refineries in 1954 was 6 percent more than in 1953. The proportion of natural-gas liquids in refinery gasoline thus increased from 9.0 percent to 9.5 percent. For the Texas Inland district this percentage jumped from 25.7 to 31.5.

For Non-Motor-Fuel Uses.—Shipments of LP-gases[1] from plants and terminals for fuel and chemical use continued to expand. Greater quantities of ethane were shipped for uses as a chemical raw material. Approximately 129 million gallons of ethane was recovered from natural gas in 1954.

The production of liquefied gases at refineries declined slightly.

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[1] For a discussion of sales of LP-gases for fuel and chemical uses, see page 306.

TABLE 6.—Production and shipments from plants and terminals[1] of natural-gas liquids in the United States, 1954, by months, in thousand gallons

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Production:													
Natural gasoline and natural-gasoline mixtures	317,029	297,628	340,382	325,857	342,490	339,300	348,810	347,332	336,971	348,868	339,896	336,664	4,021,227
LP-gases:													
Propane	241,153	213,623	213,482	182,061	190,598	173,369	157,781	162,802	178,698	204,600	233,532	245,462	2,397,161
Butane, normal	95,393	83,402	88,332	80,387	94,980	92,371	86,715	80,991	96,115	105,936	106,206	112,723	1,123,551
Isobutane	31,333	29,404	32,006	31,760	32,271	29,844	29,176	29,127	29,179	30,046	31,112	32,042	367,300
Butane-propane mixture	70,332	63,848	75,607	84,551	64,101	64,995	78,987	77,142	68,432	60,428	59,548	65,093	833,064
Other LP-gas mixtures	41,829	45,699	40,751	33,937	31,392	33,233	36,377	42,927	42,553	48,641	39,386	46,503	483,228
Isopentane	7,093	5,554	5,773	6,319	7,123	7,085	7,633	7,941	7,701	8,282	6,446	6,651	83,601
Finished gasoline and naphtha	61,139	61,977	55,830	54,010	58,790	59,362	60,596	55,123	61,648	64,850	65,942	73,801	733,068
Condensate, raw	28,712	26,905	33,628	32,316	30,907	28,256	25,889	27,182	25,540	26,302	25,933	27,658	339,178
Other products	15,993	14,782	16,507	14,970	16,261	16,552	17,329	19,345	18,492	17,298	17,498	23,181	208,208
Total	910,006	842,822	902,298	846,168	868,913	844,367	849,293	849,862	865,329	915,251	925,499	969,778	10,589,586
Stock change at plants and terminals	−23,582	32,787	17,080	17,785	63,499	56,585	35,975	−15,484	14,463	24,201	−33,022	−68,435	121,852
Shipments:													
For use in gasoline:													
Natural gasoline and natural-gasoline mixtures	337,860	296,613	345,601	325,013	333,172	325,819	335,177	366,158	336,353	355,647	355,321	343,881	4,056,615
LP-gases:													
Propane	------	------	------	------	------	------	------	------	------	------	------	------	------
Butane, normal	41,143	45,154	55,169	40,371	36,084	38,389	42,734	41,034	46,088	55,303	56,503	60,877	558,849
Isobutane	30,363	30,224	28,434	30,870	35,315	31,633	28,795	28,674	29,804	29,367	29,255	31,334	364,068
Butane-propane mixture	------	------	------	------	------	------	------	------	------	------	------	------	------
Other LP-gas mixtures	2,428	1,982	3,196	795	2,155	2,727	323	855	735	688	770	741	17,395
Isopentane	5,416	4,916	7,371	6,665	7,968	7,384	7,823	7,108	7,107	6,755	7,123	6,748	82,384
Finished gasoline and naphtha	52,743	52,444	54,193	64,601	64,819	58,119	61,851	69,011	58,097	59,410	65,966	63,767	725,021
Condensate	27,361	26,957	32,590	34,648	31,275	28,905	24,399	26,405	25,419	25,566	23,370	23,544	330,439
For other uses:													
LP-gases:[2]													
Propane	267,625	216,425	206,790	163,319	152,617	141,128	131,955	142,743	156,815	176,397	236,623	306,051	2,298,488
Butane, normal	40,772	18,377	22,704	32,713	40,493	43,983	57,023	46,381	64,352	58,386	61,305	57,655	544,144
Isobutane	------	------	------	------	------	------	------	------	------	------	------	------	------
Butane-propane mixture	72,470	59,311	75,065	81,192	57,915	62,659	70,793	75,728	68,501	59,727	65,870	75,232	824,463
Other LP-gas mixtures	38,873	43,306	37,856	32,934	29,355	30,637	36,055	42,228	41,739	48,019	38,691	45,748	465,441
Other products	16,534	14,326	16,249	15,262	14,246	16,399	16,390	19,021	15,856	15,785	17,724	22,635	200,427
Total shipments from plants and terminals	933,588	810,035	885,218	828,383	805,414	787,782	813,318	865,346	850,866	891,050	958,521	1,038,213	10,467,734

[1] Terminals owned by producers.
[2] Includes LP-gas exports.

TABLE 7.—Natural-gas liquids utilized at refineries in the United States, 1954, by Bureau of Mines refinery districts and by months, in thousand gallons

District	January	February	March	April	May	June	July	August	September	October	November	December	Total
East Coast	17,346	14,700	13,860	16,758	20,706	18,312	16,968	17,640	11,760	13,188	11,340	9,702	182,280
Appalachian	546	462	168	126	252	252	168	1,512	1,302	1,428	1,974	1,260	9,450
Indiana, Illinois, Kentucky, etc	58,002	47,334	38,556	34,608	38,430	33,222	38,388	40,110	50,862	50,694	53,844	55,314	539,364
Oklahoma, Kansas, Missouri	37,884	34,104	33,138	34,902	34,020	41,160	41,790	46,074	47,376	52,290	47,502	48,258	498,498
Texas:													
Gulf Coast	103,068	91,518	101,136	91,938	103,194	101,850	99,330	113,820	112,308	109,494	109,200	103,740	1,240,596
Inland	57,414	57,330	65,352	72,786	68,754	68,460	74,088	71,862	68,376	75,684	75,600	70,560	826,266
Total Texas	160,482	148,848	166,488	164,724	171,948	170,310	173,418	185,682	180,684	185,178	184,800	174,300	2,066,862
Louisiana-Arkansas:													
Louisiana Gulf Coast	21,546	22,050	19,152	20,538	22,176	23,394	24,402	23,898	25,410	25,158	27,426	24,780	279,930
Arkansas, Louisiana Inland	4,368	3,906	2,898	1,596	3,024	3,234	3,486	2,646	3,318	3,276	3,150	2,898	37,800
Total Louisiana-Arkansas	25,914	25,956	22,050	22,134	25,200	26,628	27,888	26,544	28,728	28,434	30,576	27,678	317,730
Rocky Mountain	9,282	7,938	9,114	6,048	7,770	7,812	9,198	10,164	11,214	11,466	10,416	11,256	111,678
California	95,130	98,112	104,706	92,862	98,196	98,070	104,958	106,302	108,528	103,026	104,916	96,390	1,211,196
Total United States	404,586	377,454	388,080	372,162	396,522	395,766	412,776	434,028	440,454	445,704	445,368	424,158	4,937,058

TABLE 8.—Percentage of natural-gas liquids in refinery gasoline in the United States, 1950–54, by Bureau of Mines refinery districts

Year	East Coast	Appalachain	Indiana, Illinois, Kentucky, etc.	Oklahoma, Kansas, Missouri	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas, Louisiana Inland	Rocky Mountain	California	Total
1950	3.5	1.7	5.0	8.3	26.0	10.7	5.9	13.8	4.1	19.0	9.5
1951	2.6	1.7	5.1	8.9	23.1	11.1	5.3	12.4	4.3	16.1	9.0
1952	2.2	.7	5.2	8.4	24.3	11.1	5.3	12.2	4.7	16.8	9.0
1953[1]	2.3	.3	5.2	8.6	25.7	10.7	5.5	9.4	5.6	16.9	9.0
1954[1]	2.8	.7	5.2	9.4	31.5	10.2	6.5	7.0	5.8	18.2	9.5

[1] Refinery gasoline excludes jet fuel.

SALES OF LIQUEFIED PETROLEUM GASES FOR FUEL AND CHEMICAL USE [1]

Domestic sales of liquefied petroleum gases for fuel and chemical use increased only 4 percent in 1954 compared with a 10-percent increase in 1953, according to a survey made by the Branch of Petroleum Economics, Bureau of Mines. Exports of LP-gases, however, continued to expand at a high rate and were 31 percent above the 1953 total, according to the Bureau of the Census, United States Department of Commerce.

LP-gases sold to manufactured-gas companies and to synthetic rubber plants declined significantly in 1954. The quantity delivered to gas companies for distribution through mains was 14 percent lower in 1954, the same percentage decline as reported for 1953, because natural gas continued to become available in additional areas. Sales to synthetic rubber plants were off 21 percent because of curtailed production of their products.

Sales of LP-gases for domestic and commercial uses increased in 1954 but at a slightly lower rate than in 1953. Industrial plants are finding new uses for LP-gases as fuel, especially where controlled temperatures are a factor; consequently, demand for this purpose increased 8 percent in 1954 or about the same as in 1953.

Chemical plants continued to consume larger quantities of LP-gases as raw material for manufacturing products. Sales of LP-gases for internal-combustion engine fuel and for "All other uses" increased 10 and 3 percent, respectively, in 1954. These increases were small compared with the very large increases reported for 1953; however, the 1953 increases reflected much broader survey coverage, as well as actual increase in sales.

TABLE 9.—Sales of LP-gases [1] in the United States, 1950–54, in thousand gallons

Year	Butane	Percent of total	Propane	Percent of total	Butane-propane mixture	Percent of total	Total LP-gases	Percent	Increase (percent)
1950	568, 038	16. 3	1, 938, 301	55. 7	976, 228	28. 0	3, 482, 567	100. 0	22. 8
1951	708, 989	16. 8	2, 418, 790	57. 2	1, 099, 496	26. 0	4, 227, 275	100. 0	21. 4
1952	639, 282	14. 3	2, 513, 595	56. 1	1, 324, 502	29. 6	4, 477, 379	100. 0	5. 9
1953	671, 320	13. 6	2, 832, 495	57. 4	1, 428, 194	29. 0	4, 932, 009	100. 0	10. 2
1954	765, 826	14. 9	2, 968, 312	57. 9	1, 391, 395	27. 2	5, 125, 533	100. 0	3. 9

[1] Data include LR-gases.

TABLE 10.—Sales of LP-gases [1] in the United States, 1950–54, by uses, in thousand gallons

Year	Domestic and commercial	Chemical	Synthetic rubber	Internal combustion	Industrial	Gas mfg.	All other	Total
1950	2, 022, 464	624, 468	228, 485	129, 818	217, 078	251, 694	8, 560	3, 482, 567
1951	2, 166, 813	844, 507	374, 864	289, 991	262, 102	281, 692	7, 306	4, 227, 275
1952	2, 266, 178	870, 990	370, 997	370, 558	324, 967	259, 697	13, 992	4, 477, 379
1953	2, 479, 180	967, 427	390, 501	498, 238	348, 517	222, 430	25, 716	4, 932, 009
1954	2, 626, 808	1, 050, 239	307, 735	547, 204	375, 121	191, 932	26, 494	5, 125, 533

[1] Data include LR-gases.

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[1] Includes LR-(liquefied-refinery) gases. Includes no LP-gases blended into gasoline but does include LP-gases used directly as a fuel for internal-combustion engines. Data include quantities sold by producers directly to consumers and all dealers' sales to consumers.

The survey covering sales of LP-gases in the Pacific coast marketing area (District 5) was made by E. T. Knudsen, supervising analyst, Branch of Petroleum Economics, Region II, Bureau of Mines, San Francisco, Calif.

TABLE 11.—Sales of LP-gases [1] in the United States, 1953–54, by PAW districts States, and uses, in thousand gallons

Districts [2] and States	Domestic and commercial		Gas manufacturing		Industrial		Synthetic rubber	
	1953	1954	1953	1954	1953	1954	1953	1954
District 1:								
Connecticut	19,615	20,456	7,456	565	17,325	14,747	93	--------
Delaware	6,444	6.356	1,908	344	2,212	3,630	--------	--------
Florida	75,234	90,712	10,532	13,683	4.000	4,265	--------	--------
Georgia	67,972	70,296	10,040	9,518	3.822	4,481	--------	--------
Maine	13,724	13,879	1,688	1,210	1,103	1,299	--------	--------
Maryland and District of Columbia	23,372	23.156	4,894	5,467	2,522	2,507	--------	--------
Massachusetts	25,910	26,256	11,377	4,276	4.337	3,377	--------	--------
New Hampshire	10,324	11,829	1,553	1,798	1,385	1,392	--------	--------
New Jersey	25,880	27,604	4,653	4,076	20.663	18,172	21	--------
New York	58,953	67.934	3,623	3.995	7,808	12.371	--------	--------
North Carolina	49,695	55,327	13,780	13,773	4.326	3,405	--------	--------
Pennsylvania	38,735	36,895	14,475	14,432	21.729	25.567	514	--------
Rhode Island	5.091	5,268	204	207	656	524	--------	--------
South Carolina	34,218	35,985	4,937	3,692	4.422	4,224	--------	--------
Vermont	8,160	9,233	2,563	2,211	540	498	--------	--------
Virginia	30,898	30.785	2,901	1,551	3.048	3,186	--------	--------
West Virginia	6,490	6,733	630	580	3.029	2.030	--------	--------
Total	500.715	538,704	97,214	81,378	102.927	105.675	628	--------
District 2:								
Illinois	101,800	115,676	8,681	5,747	20.637	21,978	2,285	2,069
Indiana	57,463	72.291	12,395	13,822	11,754	12.319	436	--------
Iowa	60,242	65.831	12,470	8,602	8.035	10,829	--------	--------
Kansas	106.269	110,393	104	19	8,506	8,024	--------	--------
Kentucky	37.642	41.446	923	350	2.075	2.446	1,181	900
Michigan	42,871	47.074	11.089	6,409	21,746	20,704	374	295
Minnesota	69,047	76,299	7,959	6,061	7.057	6.407	--------	--------
Missouri	92,172	103,147	3,368	3,230	5,503	6.130	--------	--------
Nebraska	56,038	60.532	1,796	1,497	2,091	2.879	--------	--------
North Dakota	24,922	27,473	1.760	1,468	1,175	1.117	--------	--------
Ohio	35,974	38,860	3,236	2,832	9,463	12,822	857	675
Oklahoma	120.007	139,009	1,225	1,673	7,698	5,564	397	--------
South Dakota	37,291	37,029	2,718	4,647	1,635	1,956	--------	--------
Tennessee	23,739	25,935	4,059	1,579	2,422	1,927	--------	98
Wisconsin	48,014	49,826	8,051	7,014	34,117	33,053	--------	--------
Total	913,491	1,010,821	79,834	64,950	143.914	148,155	5,530	4,037
District 3:								
Alabama	47,390	56,926	2,492	1,596	5,703	5,423	--------	--------
Arkansas	97,075	94,286	355	--------	3,722	3.913	--------	--------
Louisiana	82,100	73,862	565	180	3,235	10.922	81,194	37,206
Mississippi	79.092	78,645	112	21	1,460	828	--------	--------
New Mexico	40,572	34.755	3,240	4,012	4,035	4,055	--------	--------
Texas	375,401	373,450	8,017	7,611	66,322	75,644	266,045	248,021
Total	721,630	711,924	14,781	13,420	84,477	100,785	347,239	285,227
District 4:								
Colorado	46,024	64,966	1,028	1,260	1,377	1.451	--------	--------
Idaho	7,458	9,519	2,390	1,363	586	699	--------	--------
Montana	12,878	18,134	485	503	568	1,709	--------	--------
Utah	7,224	9,292	225	1.100	867	944	--------	--------
Wyoming	22,271	22,963	--------	--------	1,178	1.016	--------	--------
Total	95,855	124,874	4,128	4,226	4,576	5,819	--------	--------
District 5:								
Arizona	20,495	16,078	20	--------	717	3,053	--------	--------
California	173,057	166,542	4,631	5,884	6,904	5,508	37,104	18,471
Nevada	8.521	8,644	7,163	6.517	1,252	1,238	--------	--------
Oregon	31,550	34,102	9,356	8,616	1,339	1,587	--------	--------
Washington	13.866	15,119	5,303	6,941	2,411	3,301	--------	--------
Total	247,489	240,485	26,473	27.958	12.623	14,687	37,104	18,471
Total United States	2,479,180	2.626.808	222,430	191.932	348,517	375,121	390,501	307,735

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[1] Data include LR-gases.

[2] States are grouped according to petroleum-marketing districts rather than geographic regions.

TABLE 11.—Sales of LP-gases [1] in the United States, 1953–54, by PAW districts, States, and uses, in thousand gallons—Continued

Districts [2] and States	Chemical		Internal combustion		All other		Total		Percent of total	
	1953	1954	1953	1954	1953	1954	1953	1954	1953	1954
District 1:										
Connecticut	--------	--------	700	636	2,088	2,869	47,277	39,273	5.4	4.3
Delaware	860	225	108	90	4	22	11,536	10,667	1.3	1.2
Florida	296	--------	1,569	2,202	208	540	91,839	111,402	10.5	12.2
Georgia	113	122	1,886	2,286	518	1,278	84,351	87,981	9.6	9.6
Maine	--------	--------	40	41	1,658	1,320	18,213	17,749	2.1	1.9
Maryland and District of Columbia	--------	--------	44	50	75	102	30,907	31,282	3.5	3.4
Massachusetts	--------	--------	108	163	244	513	41,976	34,585	4.8	3.8
New Hampshire	--------	--------	--------	--------	33	29	13,295	15,048	1.5	1.7
New Jersey	3,530	21,803	38	121	397	461	55,182	72,237	6.3	7.9
New York	3,303	3,292	87	117	12	67	73,786	87,776	8.4	9.6
North Carolina	524	551	881	1,166	2,371	1,545	71,577	75,767	8.2	8.3
Pennsylvania	7,535	7,434	244	626	74	63	83,306	85,017	9.5	9.3
Rhode Island	--------	--------	--------	--------	--------	--------	5,951	5,999	.7	.7
South Carolina	466	562	191	219	791	627	45,025	45,309	5.1	5.0
Vermont	--------	--------	--------	--------	--------	--------	11,263	11,942	1.3	1.3
Virginia	201	40	129	157	39	44	37,216	35,763	4.2	3.9
West Virginia	143,688	134,860	728	625	--------	60	154,565	144,888	17.6	15.9
Total	160,516	168,889	6,753	8,499	8,512	9,540	877,265	912,685	100.0	100.0
District 2:										
Illinois	2,289	2,649	22,099	37,395	389	393	158,180	185,907	11.6	12.6
Indiana	41,094	39,006	6,533	5,963	879	950	130,554	144,351	9.6	9.8
Iowa	--------	42	2,528	2,702	380	390	83,655	88,396	6.1	6.0
Kansas	--------	52	15,970	16,756	245	522	131,094	135,766	9.6	9.2
Kentucky	53,717	55,420	1,917	3,310	38	37	97,493	103,909	7.1	7.1
Michigan	2,834	1,504	4,252	3,515	38	141	83,204	79,642	6.1	5.4
Minnesota	--------	--------	7,958	5,653	125	590	92,146	95,010	6.7	6.5
Missouri	--------	--------	5,574	5,629	245	104	106,862	118,240	7.8	8.0
Nebraska	--------	4	5,698	5,732	139	144	65,762	70,788	4.8	4.8
North Dakota	10	--------	8,906	7,712	147	129	36,920	37,899	2.7	2.6
Ohio	383	866	2,230	2,264	83	87	52,226	58,406	3.8	4.0
Oklahoma	864	3,277	26,420	29,489	132	300	156,743	179,312	11.5	12.2
South Dakota	--------	--------	2,714	2,456	242	222	44,600	46,310	3.3	3.2
Tennessee	2,319	1,542	758	1,243	207	194	33,504	32.518	2.4	2.2
Wisconsin	--------	--------	3,357	4,171	122	157	93,661	94,221	6.9	6.4
Total	103,510	104,362	116,914	133,990	3,411	4,360	1,366,604	1,470,675	100.0	100.0
District 3:										
Alabama	--------	--------	1,862	2.366	90	77	57,537	66,388	2.7	3.1
Arkansas	--------	--------	10,331	19,523	1,165	971	112,648	118,693	5.3	5.5
Louisiana	115,104	162,777	23,847	25,111	111	134	306,156	310,192	14.5	14.4
Mississippi	--------	11	12,006	14,446	1,304	1,311	93,974	95,262	4.4	4.4
New Mexico	--------	--------	28,769	26.238	1,409	1,220	78,025	70,280	3.7	3.2
Texas	540,943	547,216	207,488	241,889	6,815	5,524	1,471,031	1,499,355	69.4	69.4
Total	656,047	710,004	284,303	329,573	10,894	9,237	2,119,371	2,160,170	100.0	100.0
District 4:										
Colorado	--------	75	4,793	6,619	215	199	53,437	74,570	44.4	49.4
Idaho	--------	--------	107	121	35	25	10,576	11,727	8.8	7.8
Montana	--------	--------	2,936	2,209	--------	--------	16,867	22,555	14.0	14.9
Utah	--------	--------	1,757	1,373	106	118	10,179	12,827	8.4	8.5
Wyoming	--------	--------	5,885	5,224	35	36	29,369	29,239	24.4	19.4
Total	--------	75	15,478	15,546	391	378	120,428	150,918	100.0	100.0
District 5:										
Arizona	--------	--------	8,129	8,032	100	--------	29,461	27,163	6.6	6.3
California	47,354	66,909	65,139	49.843	2,290	2,399	336,479	315,556	75.1	73.2
Nevada	--------	--------	229	196	12	133	17,177	16,728	3.8	3.9
Oregon	--------	--------	1,196	1,226	102	95	43,543	45,626	9.7	10.6
Washington	--------	--------	97	299	4	352	21,681	26,012	4.8	6.0
Total	47,354	66,909	74,790	59.596	2,508	2,979	448,341	431,085	100.0	100.0
Total United States	967,427	1,050,239	498,238	547,204	25,716	26,494	4,932,009	5,125,533	------	------

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[1] Data include LR-gases.
[2] States are grouped according to petroleum-marketing districts rather than to geographic regions.

TABLE 12.—Sales of LP-gases [1] in the United States, 1953–54, by PAW districts and States, in thousand gallons

District and State [2]	Butane		Propane		Mixture		Total LP-gases		Change (percent)
	1953	1954	1953	1954	1953	1954	1953	1954	
District 1:									
Connecticut	4,558	1,031	40,957	37,403	1,762	839	47,277	39,273	−16.9
Delaware	--------	--------	11,536	10,667	--------	--------	11,536	10,667	−7.5
Florida	2,655	2,991	58,481	74,043	30,703	34,368	91,839	111,402	21.3
Georgia	2,975	1,561	53,445	57,383	27,931	29,037	84,351	87,981	4.3
Maine	10	--------	18,203	17,749	--------	--------	18,213	17,749	−2.5
Maryland and District of Columbia	525	495	30,382	30,787	--------	--------	30,907	31,282	1.2
Massachusetts	5,296	430	36,680	34,155	--------	--------	41,976	34,585	−17.6
New Hampshire	--------	84	12,587	14,539	708	425	13,295	15,048	13.2
New Jersey	5,555	22,247	47,902	48,614	1,725	1,376	55,182	72,237	30.9
New York	1,646	3,023	69,005	81,733	3,135	3,020	73,786	87,776	19.0
North Carolina	1,700	968	66,281	71,619	3,596	3,180	71,577	75,767	5.9
Pennsylvania	2,808	1,676	75,284	82,497	5,214	844	83,306	85,017	2.1
Rhode Island	--------	--------	5,951	5,999	--------	--------	5,951	5,999	.8
South Carolina	3,342	2,483	32,449	32,230	9,234	10,596	45,025	45,309	.6
Vermont	--------	7	11,203	11,897	60	38	11,263	11,942	6.0
Virginia	513	516	36,681	35,226	22	21	37,216	35,763	−3.9
West Virginia	5,618	14,163	16,578	24,053	132,369	106,672	154,565	144,888	−6.3
Total	37,201	51,675	623,605	670,594	216,459	190,416	877,265	912,685	4.0
District 2:									
Illinois	9,606	11,025	142,962	165,461	5,612	9,421	158,180	185,907	17.5
Indiana	7,748	5,397	82,351	100,130	40,455	38,824	130,554	144,351	10.6
Iowa	4,050	2,946	77,834	84,466	1,771	984	83,655	88,396	5.7
Kansas	15,723	14,798	88,226	99,019	27,145	21,949	131,094	135,766	3.6
Kentucky	2,240	2,950	39,110	43,891	56,143	57,068	97,493	103,909	6.6
Michigan	8,436	6,075	73,877	72,597	891	970	83,204	79,642	−4.3
Minnesota	2,613	1,968	84,249	91,725	5,284	1,317	92,146	95,010	3.1
Missouri	3,363	3,127	95,556	105,896	7,943	9,217	106,862	118,240	10.6
Nebraska	2,858	5,236	61,404	62,214	1,500	3,338	65,762	70,788	7.6
North Dakota	1,285	929	31,481	34,691	4,154	2,279	36,920	37,899	2.7
Ohio	2,622	4,507	48,446	53,017	1,158	882	52,226	58,406	11.8
Oklahoma	20,954	22,729	86,830	94,864	48,959	61,719	156,743	179,312	14.4
South Dakota	911	1,345	43,044	44,401	645	564	44,600	46,310	3.8
Tennessee	1,027	1,226	26,596	26,547	5,881	4,745	33,504	32,518	−2.9
Wisconsin	20,543	17,940	67,818	73,969	5,300	2,312	93,661	94,221	.6
Total	103,979	102,198	1,049,784	1,152,888	212,841	215,589	1,366.604	1,470,675	7.6
District 3:									
Alabama	1,719	3,201	28,500	27,008	27,318	36,179	57,537	66,388	15.4
Arkansas	10,923	12,019	40,169	48,717	61,556	57,957	112,648	118,693	5.4
Louisiana	89,801	198,391	139,190	31,546	77,165	80,255	306,156	310,192	1.3
Mississippi	6,119	4,851	28,439	34,795	59,416	55,616	93,974	95,262	1.4
New Mexico	9,805	7,602	43,778	39,760	24,442	22,918	78,025	70,280	−9.9
Texas	346,314	334,073	513,404	537,494	611,313	627,788	1,471,031	1,499,355	1.9
Total	464,681	560,137	793,480	719,320	861,210	880,713	2,119,371	2,160,170	1.9
District 4:									
Colorado	3,134	3,703	47,527	66,828	2,776	4,039	53,437	74,570	39.5
Idaho	84	434	10,290	11,216	202	77	10,576	11,727	10.9
Montana	1,124	631	15,335	21,615	408	309	16,867	22,555	33.7
Utah	438	415	9,678	12,239	63	173	10,179	12,827	26.0
Wyoming	4,169	3,322	20,584	23,643	4,616	2,274	29,369	29,239	−.4
Total	8,949	8,505	103,414	135,541	8,065	6,872	120,428	150,918	25.3
District 5:									
Arizona	--------	--------	12,401	8,542	17,060	18,621	29,461	27,163	−7.8
California	54,546	43,311	176,958	196,659	104,975	75,586	336,479	315,556	−6.2
Nevada	--------	--------	14,604	15,355	2,573	1,373	17,177	16,728	−2.6
Oregon	--------	--------	40,885	44,679	2,658	947	43,543	45,626	4.8
Washington	1,964	--------	17,364	24,734	2,353	1,278	21,681	26,012	20.0
Total	56,510	43,311	262,212	289,969	129,619	97,805	448,341	431,085	−3.8
Total United States	671,320	765,826	2,832,495	2,968,312	1,428,194	1,391,395	4,932.009	5,125,533	3.9
Exports [3]	--------	--------	--------	--------	--------	--------	[4] 124,749	[4] 163,702	31.2
Grand total	--------	--------	--------	--------	--------	--------	5,056,758	5,289,235	4.6

[1] Data include LR-gases.
[2] States are grouped according to petroleum-marketing districts rather than to geographic regions.
[3] Not available by the different gases.
[4] Converted from pounds to gallons at 4.5 pounds per gallon.

STOCKS

Stocks of natural-gas liquids at plants and terminals increased 122 million gallons in 1954. This was the second consecutive year for which an increase of such size was reported. The increase entirely resulted from an increase in LP-gas stocks, as the increase in natural-gasoline stocks was offset by a decline in stocks of "other products." Underground stocks of LP-gases increased 141 million gallons during the year and stood at 213 million at the end of the year.

At refineries, stocks of natural-gas liquids, predominantly natural gasoline, increased 30 million gallons.

TABLE 13.—Stocks of natural-gas liquids in the United States, 1950–53, and 1954, by months, in thousand gallons

Date	Natural gasoline		LP-gases		Other products		Total		
	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	Grand total
Dec. 31:									
1950	103, 341	72, 492	51, 630	18, 144	58, 673	4, 620	213, 644	95, 256	308, 900
1951	111, 426	94. 752	53, 256	11, 718	68, 166	4, 494	232, 848	110, 964	343, 812
1952	84, 462	69, 426	92, 022	15, 120	63, 924	2, 940	240, 408	87, 486	327, 894
1953	126, 924	60, 312	157, 164	13, 986	75, 978	3, 612	360, 066	77, 910	437, 976
1954									
Jan. 31	110, 038	72, 534	141, 262	13, 608	85, 184	11, 382	336, 484	97, 524	434, 008
Feb. 28	111, 691	54, 600	162, 459	14, 532	95, 121	5, 754	369, 271	74, 886	444, 157
Mar. 31	104. 874	73, 164	183, 423	13, 482	98, 054	7, 770	386. 351	94, 416	480, 767
Apr. 30	105, 372	90, 174	213, 925	13, 524	84, 839	8, 568	404, 136	112, 266	516, 402
May 31	113, 845	90, 972	273, 333	15, 456	80, 457	8, 526	467, 635	114, 954	582, 589
June 30	127, 027	83, 622	315, 989	12, 432	81, 204	9, 660	524, 220	105, 714	629, 934
July 31	140, 470	72. 534	337, 347	14, 658	82, 378	12, 138	560, 195	99, 330	659, 525
Aug. 31	122, 477	79, 884	352, 693	16, 212	69, 541	5, 124	544, 711	101, 220	645, 931
Sept. 30	123, 689	63, 294	359, 636	17, 010	75, 849	5, 544	559, 174	85, 848	645, 022
Oct. 31	118, 437	58, 044	381, 400	17. 472	83, 538	7, 560	583, 375	83, 076	666, 451
Nov. 30	102, 335	57, 120	362, 167	20, 118	85. 851	9, 450	550, 353	86, 688	637, 041
Dec. 31	95, 021	76, 650	286, 352	22, 176	100, 545	8, 862	481, 918	107, 688	589, 606

PRICES

The average posted price of grade 26–70 natural gasoline to blenders f. o. b. group 3 basis was 4.87 cents per gallon in 1954, 0.91 cent per gallon below 1953. The posted price was 5.5 cents per gallon at the beginning of the year. The first price decline came in January and the price had declined to 4.0 cents per gallon by April. Gradual increases raised the price back to 5.5 cents by October 30. Producers' realization from all natural-gasoline sales averaged 7.24 cents per gallon in 1954 compared with 7.18 cents in 1953. The higher average realization reflected greater sales of the higher-priced grades of natural gasoline.

The average posted price of propane, f. o. b. Houston, Tex., in 1954 was 3.28 cents per gallon, 0.74 cent per gallon below the 1953 average. The average value received by producers for all LP-gases also declined in 1954, averaging 3.44 cents per gallon, 0.64 cent per gallon less than in 1953.

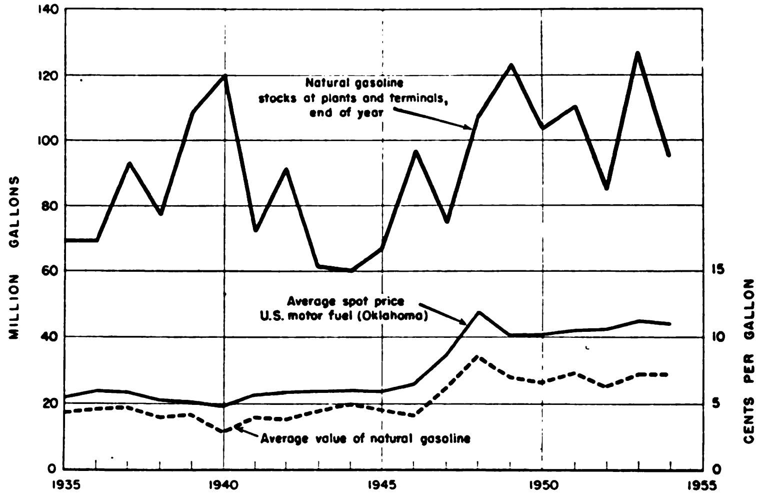

FIGURE 2.—Average value of natural gasoline, spot price of gasoline, and stocks of natural gasoline, 1935–54.

FOREIGN TRADE[2]

Exports of LP-gases increased 32 percent in 1954, primarily because of the much larger shipments to Mexico and Brazil. Shipments to Canada, our other major export customer, increased less rapidly, under 4 percent above 1953.

Exports of natural gasoline declined 37 percent, with only Canada receiving a substantial volume. No natural gasoline was shipped to Europe or Australia in either 1953 or 1954.

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[2] Figures on exports compiled by Mae B. Price and Elsie D. Page, of the Bureau of Mines, from records of the U. S. Department of Commerc

TABLE 14.—LP-gases[1] exported from the United States, 1945–49 (average) and 1950–54, by countries, in thousand gallons[2]

[U. S. Department of Commerce]

	1945–49 (average)	1950	1951	1952	1953	1954
North America:						
Canada-Newfoundland-Labrador	26,978	34,032	43,293	42,951	56,155	58,330
Cuba	159	1,264	2,228	3,453	4,719	5,865
Mexico	14,932	25,416	31,977	40,003	49,567	72,994
Other North America	392	619	907	1,092	1,324	1,608
Total	42,461	61,331	78,405	87,499	111,765	138,797
South America:						
Brazil	1,409	4,686	6,413	11,046	12,469	24,657
Other South America	129	90	4	7	1	145
Total	1,538	4,776	6,417	11,053	12,470	24,802
Europe:						
France	805	639	1,266	1	13	7
Other Europe	158	1	8	11	15	31
Total	963	640	1,274	12	28	38
Asia:						
Japan	------------	74	161	27	(3)	250
Philippines	396	751	783	528	243	269
Other Asia	19	74	32	(3)	(3)	24
Total	415	899	976	555	243	543
Africa	38	77	128	109	162	87
Oceania	42	40	45	68	81	41
Grand total	45,457	67,763	87,245	99,296	124,749	164,308

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[1] Data include LR-gases.
[2] Converted from pounds to gallons at 4.5 pounds per gallon.
[3] Less than 500 gallons.

TABLE 15.—Natural-gasoline exported from the United States, 1945–49 (average) and 1950–54, by countries, in thousand gallons

[U. S. Department of Commerce]

	1945–49 (average)	1950	1951	1952	1953	1954
North America:						
Canada	54,400	35,513	30,024	26,631	34,186	24,854
Mexico	571	7	4	--------	18	16
Netherland Antilles	16,672	3,870	4,285	24,049	5,604	--------
Trinidad	2,723	--------	--------	--------	--------	--------
Other North America	20	3	--------	--------	--------	38
Total	74,386	39,393	34,313	50,680	39,808	24,908
Europe:						
Italy	----------	--------	616	638	--------	--------
United Kingdom	58,251	2,547	--------	--------	--------	--------
Other Europe	4,150	--------	34	--------	--------	--------
Total	62,401	2,547	650	638	--------	--------
Asia	1,141	--------	--------	--------	--------	--------
Africa	18	--------	19	--------	--------	--------
Oceania:						
Australia	6,374	--------	29,843	15,472	--------	--------
New Zealand	----------	--------	4,094	2,316	--------	--------
Other Oceania	213	--------	--------	--------	--------	--------
Total	6,587	--------	33,937	17.788	--------	--------
Grand total	144,533	41,940	68,919	69,106	39,808	24,908

Crude Petroleum and Petroleum Products

By Alfred G. White, Albert T. Coumbe, Donald S. Colby, and Emma M. Seeley

GENERAL SUMMARY

TOTAL DEMAND [1] for petroleum and petroleum products set another record in 1954, although the 1.3-percent gain over 1953 was the smallest annual increase since 1949. Outstanding features of the petroleum situation in 1954 were the decline in exports, the smallest annual gain in gasoline demand since 1946, improvement in the demand for heating oils owing to more normal weather, and a sharp drop in the demand for residual fuel oil.

Exports of oil fluctuate with the available supplies abroad, the competitive position of American companies in foreign markets, and problems of dollar exchange. Total exports declined over 11 percent in 1954, with a decrease of 32 percent in crude oil and 8 percent in products. The downward trend in crude exports was related to expansion of the domestic crude supply in Canada, while the decrease in product exports reflects the increase in refinery capacity, primarily in western Europe, that has taken care of the product shortage following the shutdown of the Abadan refinery in Iran in 1951.

The domestic demand for petroleum and petroleum products in continental United States increased only 1.9 percent in 1954, compared with gains of 4.4 percent in 1953, 3.4 percent in 1952, and 8.2 percent in 1951. The decline in industrial activity and fuel-oil demands that started in the latter part of 1953 continued through 1954. Furthermore, the demand for oil was affected by a greater relative increase in natural-gas supply and shifts from heavy fuel oil to coal in some areas. The relative changes by quarters, compared with 1953, indicate the trend during 1954. The 3.0-percent increase in domestic demand in the first quarter was due primarily to colder weather, resulting in a sharp increase in heating-oil requirements; the 1.7-percent decline in the second quarter marked a low level in industrial-fuel requirements that continued through the third quarter, with a gain of only 0.4 percent, and the 5.7-percent gain in domestic demand in the fourth quarter indicated the effect of much colder weather than in the last quarter of 1953, an upward turn in industrial-fuel requirements, and a comparison with the lowest level in seasonal demand in 1953.

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[1] Certain terms, as utilized in this chapter, are more or less unique to the petroleum industry. Principal terms and their meaning are as follows:

Total demand.—A derived figure representing total new supply plus decreases or minus increases in reported stocks. Because there are substantial secondary and consumers' stocks that are not reported to the Bureau of Mines, this figure varies considerably from consumption.

Domestic demand.—Total demand less exports.

New supply of all oils.—The sum of crude-oil production, plus production of natural-gas liquids, plus benzol (coke-oven) used for motor fuel plus imports of crude oil and other petroleum products.

Transfers.—Crude oil conveyed to fuel-oil stocks without processing or reclassification of products from one product category to another.

All oils.—Crude petroleum, natural-gas liquids, and their derivatives.

Principal products.—Gasoline, kerosine, distillate fuel oil, and residual fuel oil.

Exports.—Total shipments from continental United States, including shipments to United States Territories and possessions.

TABLE 1.—Salient statistics of crude petroleum, refined products, and natural-gas liquids in the United States, 1950–54 [1]

	1950	1951	1952	1953	1954 [2]
Crude petroleum:					
Domestic production.....thousand barrels [3]..	1,973,574	2,247,711	2,289,836	2,357,082	2,316,323
World production..........................do....	3,803;027	4,286,801	4,508,954	4,770,779	4,990,899
United States proportion..........percent..	52	52	51	49	46
Imports [4]...............thousand barrels [3]..	177,714	179,073	209,591	236,455	239,479
Exports [5]...............................do....	34,823	28,604	26,696	19,931	13,564
Stocks, end of year......................do....	248,463	255,783	271,928	274,445	258,385
Runs to stills...........................do....	2,094,867	2,370,404	2,441,259	2,554,865	2,539,564
Value of domestic production at wells:					
Total..................thousand dollars..	4,963,380	5,690,410	5,785,230	6,327,100	6,427,140
Average per barrel..........................	$2.51	$2.53	$2.53	$2.68	$2.77
Total producing oil wells Dec. 31............	465,870	474,990	488,520	498,940	511,200
Total oil wells completed during year (successful wells)................................	24,430	23,453	23,466	25,762	29,773
Refined products:					
Imports [5]...............thousand barrels [3]..	132,547	129,121	138,916	141,044	144,430
Exports [5]...............................do....	76,483	125,448	131,492	126,660	116,457
Stocks, end of year [6]...................do....	326,892	[7] 351,146 [8] 370,140	394,019	440,634	442,510
Output of gasoline.......................do....	1,024,462	1,140,843	[9] 1,178,027	1,266,376	1,269,152
Yield of gasoline....................percent..	43.0	42.4	42.4	43.9	43.8
Average dealers' net price (excluding tax) of gasoline in 50 United States cities cents per gallon [10]..	15.10	15.33	15.27	15.95	16.19
Completed refineries, end of year............	357	350	343	337	326
Daily crude-oil capacity thousand barrels [3]..	6,964	7,333	7,639	8,007	8,421
Natural-gas liquids:					
Production...............thousand barrels [3]..	181,961	204,754	223,515	238,579	248,136
Stocks, end of year......................do....	7,355	8,186	7,807	10,428	14,038

[1] Data, including imports and exports are for continental United States.

[2] Preliminary figures.

[3] 42 gallons per barrel.

[4] Bureau of Mines.

[5] U. S. Department of Commerce, except Alaska and Hawaii, which are Bureau of Mines data. Exports include shipments to the Territories.

[6] Data for 1950 not comparable with that for succeeding years; for 1951 and succeeding years definition of bulk terminals for reporting purposes was redefined as follows:

1. All bulk installations that receive their supplies by tankers, barges, or pipelines.
2. Any other storage point with a combined capacity of 50,000 barrels or more, regardless of the transportation means of products.

[7] Based upon definition of bulk terminal prior to 1951.

[8] 1952 basis.

[9] Data for 1952 and subsequent years excluded jet fuel.

[10] American Petroleum Institute.

Total new supply of all oils amounted to 2,949 million barrels in 1954, a decline of 0.8 percent. In 1954 crude production decreased 1.7 percent, the production of light oils from natural gas gained 4.0 percent, crude-oil imports increased 1.3 percent, and product imports rose 2.4 percent. Total imports represented 13.0 percent of new supply in 1954 compared with 12.7 percent in 1953. The decline in new supply was related to a decrease of 11 million barrels in total stocks in 1954 compared with 1953 when 52 million barrels were added to stocks.

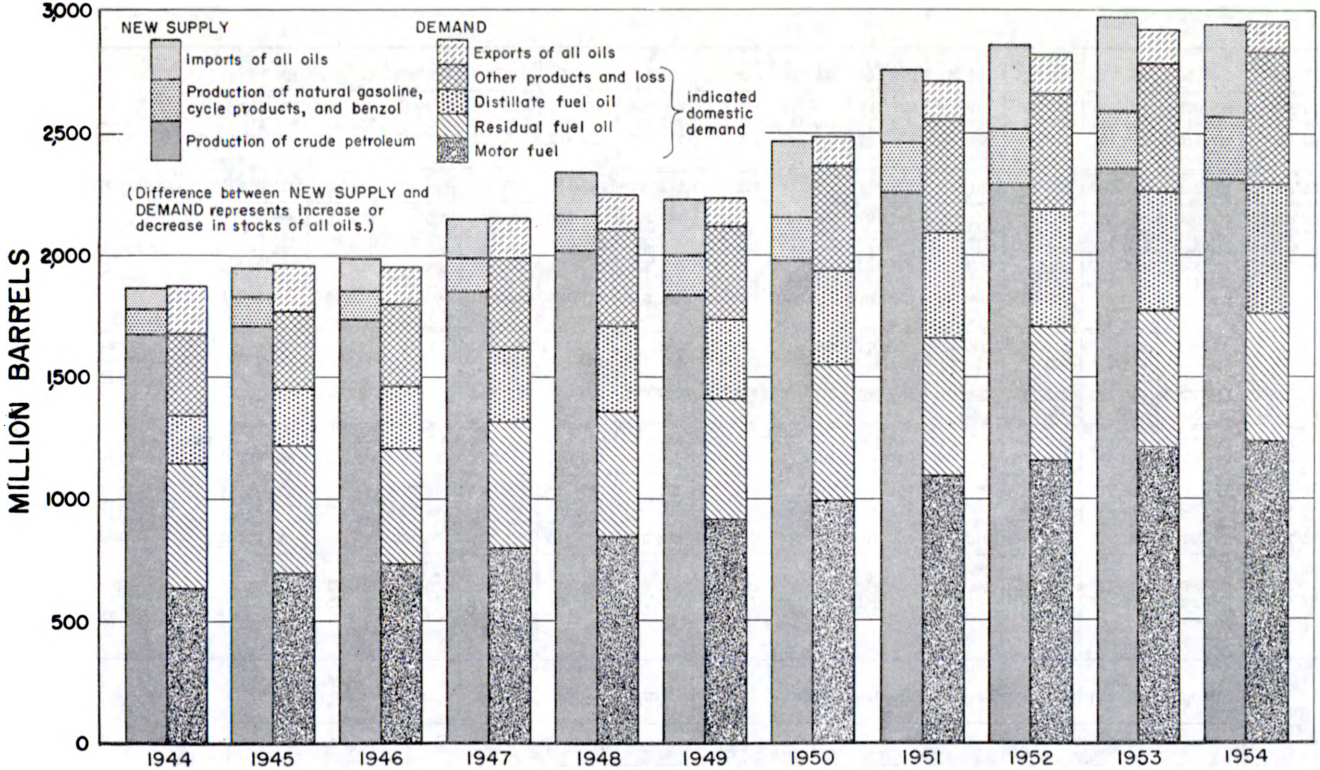

FIGURE 1.—Supply and demand of all oils in the United States, 1944–54.

TABLE 2.—Supply and demand of all oils [1] in continental United States, 1952 (total) and 1953–54, by months

(Thousand barrels)

	1953													1952 (total)
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	203, 211	183, 183	202, 024	191, 953	198, 117	197, 630	204, 711	204, 490	196, 571	193, 726	188, 116	193, 350	2, 357, 082	2, 289, 836
Natural-gas liquids	20, 377	18, 178	19, 935	19, 284	19, 413	19, 208	19, 843	20, 292	19, 894	20, 557	20, 244	21, 354	238, 579	223, 515
Benzol, etc	37	25	39	41	42	45	62	55	38	33	38	50	505	382
Total production	223, 625	201, 386	221, 998	211, 278	217, 572	216, 883	224, 616	224, 837	216, 503	214, 316	208, 398	214, 754	2, 596, 166	2, 518, 733
Imports:														
Crude petroleum [2]	19, 098	16, 400	20, 320	18, 839	21, 677	21, 207	19, 513	20, 847	20, 757	19, 806	19, 444	18, 547	236, 455	209, 591
Refined products [2]	15, 953	12, 766	13, 924	11, 054	11, 442	9, 925	9, 164	7, 810	9, 106	10, 454	13, 675	15, 771	141, 044	138, 916
Total new supply	258, 676	230, 552	256, 242	241, 171	250, 691	248, 015	253, 293	253, 494	246, 366	244, 576	241, 517	249, 072	2, 973, 665	2, 862, 240
Increase (+) or decrease (−) in stocks	−8, 891	−8, 018	+1, 610	+1, 009	+24, 136	+8, 160	+20, 679	+25, 084	+9, 940	+7, 414	−1, 226	−28, 144	+51, 753	+39, 645
Demand:														
Total demand	267, 567	238, 570	254, 632	240, 162	226, 555	239, 855	232, 614	228, 410	236, 426	237, 162	242, 743	277, 216	2, 921, 912	2, 822, 595
Exports: [3]														
Crude petroleum	2, 211	2, 011	2, 171	2, 833	1, 611	1, 824	1, 232	1, 321	1, 109	1, 178	1, 052	1, 378	19, 931	26, 696
Refined products	9, 636	11, 013	11, 567	12, 327	10, 260	10, 862	10, 029	9, 450	10, 450	10, 200	10, 112	10, 754	126, 660	131, 492
Domestic demand:														
Gasoline	88, 131	84, 636	96, 666	100, 116	104, 198	112, 641	111, 004	106, 778	103, 640	103, 431	96, 875	97, 659	1, 205, 775	1, 142, 987
Kerosine	16, 797	13, 335	11, 793	7, 704	5, 033	4, 816	5, 298	4, 383	7, 097	9, 188	11, 537	17, 486	114, 467	121, 253
Distillate fuel oil	63, 541	52, 361	50, 328	38, 137	28. 066	29, 866	24, 550	26, 091	34, 110	33, 890	43, 762	63, 373	488, 075	476, 986
Residual fuel oil	57, 432	47, 847	52, 540	46, 987	44, 186	42, 750	40, 751	40, 762	42, 270	44, 127	46, 928	53, 894	560, 474	555, 165
Lubricants	3, 031	2, 937	3, 229	3, 625	3, 446	3, 470	3, 905	3, 661	3, 563	3, 378	3, 209	3, 043	40, 497	38, 165
Miscellaneous	26, 788	24, 430	26, 338	28, 433	29, 755	33, 626	35, 845	35, 964	34, 187	31, 770	29, 268	29, 629	366, 033	329, 851
Total domestic demand	255, 720	225, 546	240, 894	225, 002	214, 684	227, 169	221, 353	217. 639	224, 867	225, 784	231, 579	265, 084	2, 775, 321	2, 664, 407
Stocks:														
Crude petroleum	272, 250	273, 589	275, 665	278, 943	278, 575	281, 744	282, 915	283, 666	287, 694	285, 490	280, 817	274, 445	274, 445	271, 928
Natural-gas liquids	7, 575	7, 748	8, 268	8, 849	10, 359	11, 054	11, 253	11, 959	12, 636	13, 193	12, 223	10, 428	10, 428	7, 807
Refined products	385, 038	375, 508	374, 522	371, 672	394, 666	398, 962	418, 271	441, 898	447, 133	456, 194	460, 611	440, 634	440, 634	394, 019
Total stocks	664, 863	656, 845	658, 455	659, 464	683, 600	691, 760	712, 439	737, 523	747, 463	754, 877	753, 651	725, 507	725, 507	673, 754

	1954 [4]													1953 (total)
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	193, 453	178, 603	201, 702	198, 440	200, 593	195, 000	194, 037	191, 190	184, 527	190, 198	190, 367	198, 213	2, 316, 323	2, 357, 082
Natural-gas liquids	21, 323	19, 749	21, 142	19, 828	20, 362	19, 785	19, 901	19, 914	20, 276	21, 446	21, 686	22, 724	248, 136	238, 579
Benzol, etc	34	35	38	34	22	57	45	46	52	43	48	53	507	505
Total production	214, 810	198, 387	222, 882	218, 302	220, 977	214, 842	213, 983	211, 150	204, 855	211, 687	212, 101	220, 990	2, 564, 966	2, 596, 166
Imports:														
Crude petroleum [2]	19, 141	17, 395	20, 260	17, 229	21, 957	18, 728	22, 448	20, 589	20, 168	19, 893	19, 082	22, 589	239, 479	236, 455
Refined products [2]	14, 815	14, 234	13, 204	10, 882	9, 200	10, 749	9, 208	8, 649	9, 349	12, 389	14, 000	17, 751	144, 430	141, 044
Total new supply	248, 766	230, 016	256, 346	246, 413	252, 134	244, 319	245, 639	240, 388	234, 372	243, 969	245, 183	261, 330	2, 948, 875	2, 973, 665
Increase (+) or decrease (−) in stocks	−28, 473	−6, 991	−2, 688	+11, 771	+29, 183	+10, 681	+14, 170	+5, 773	+3, 012	+3, 365	−13, 458	−36, 919	−10, 574	+51, 753
Demand:														
Total demand	277, 239	237, 007	259, 034	234, 642	222, 951	233, 638	231, 469	234, 615	231, 360	240, 604	258, 641	298, 249	2, 959, 449	2, 921, 912
Exports: [3]														
Crude petroleum	1, 588	795	873	1, 418	1, 258	1, 372	1, 073	1, 349	509	1, 485	1, 047	797	13, 564	19, 931
Refined products	8, 577	9, 170	8, 804	10, 091	10, 319	11, 370	10, 443	8, 891	8, 616	10, 094	10, 280	9, 802	116, 457	126, 660
Domestic demand:														
Gasoline	89, 852	86, 206	101, 549	103, 866	104, 418	113, 037	112, 231	110, 223	104, 706	105, 607	102, 393	104, 258	1, 238, 346	1, 205, 775
Kerosine	18, 287	12, 682	12, 990	6, 893	4, 861	4, 537	4, 920	6, 196	6, 555	9, 261	12, 748	18, 330	118, 260	114, 467
Distillate fuel oil	74, 697	52, 729	54, 051	38, 105	28, 895	27, 217	26, 864	29, 203	32, 593	34, 893	51, 279	75, 843	526, 369	488, 075
Residual fuel oil	53, 736	46, 674	48, 794	42, 178	38, 994	37, 753	35, 617	36, 934	38, 904	42, 415	46, 045	54, 055	522, 099	560, 474
Lubricants	2, 994	2, 720	3, 579	3, 321	3, 208	3, 189	3, 419	3, 374	3, 308	3, 285	3, 086	2, 961	38, 444	40, 497
Miscellaneous	27, 508	26, 031	28, 394	28, 770	30, 998	35, 163	36, 902	38, 445	36, 169	33, 564	31, 763	32, 203	385, 910	366, 033
Total domestic demand	267, 074	227, 042	249, 357	223, 133	211, 374	220, 896	219, 953	224, 375	222, 235	229, 025	247, 314	287, 650	2, 829, 428	2, 775, 321
Stocks:														
Crude petroleum	268, 531	264, 629	269, 620	278, 055	280, 050	282 888	282, 665	277, 929	272, 502	267, 346	264, 566	258, 385	258, 385	274, 445
Natural-gas liquids	10, 334	10, 575	11, 447	12, 295	13, 871	14, 998	15, 703	15, 379	15, 358	15, 868	15, 168	14, 038	14, 038	10, 428
Refined products	418, 169	414, 839	406, 288	408, 776	434, 388	441, 104	454, 792	465, 625	474, 085	482, 096	472, 118	442, 510	442, 510	440, 634
Total stocks	697, 034	690, 043	687, 355	699, 126	728, 309	738, 990	753, 160	758, 933	761, 945	765, 310	751, 852	714, 933	714, 933	725, 507

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[1] For definition of this and other terms used in the petroleum industry, see text footnote 1 at the beginning of this chapter.
[2] Bureau of Mines.
[3] U. S. Department of Commerce, except for exports to Alaska and Hawaii, which are Bureau of Mines data.
[4] Preliminary figures.

TABLE 3.—Demand for all oils [1] in continental United States, 1945–54

(Million barrels)

Year	Domestic demand	Exports	Total demand	Year	Domestic demand	Exports	Total demand
1945	1,772.7	183.0	1,955.7	1950	2,375.1	111.3	2,486.4
1946	1,792.8	153.1	1,945.9	1951	2,569.8	154.1	2,723.9
1947	1,989.8	164.5	2,154.3	1952	2,664.4	158.2	2,822.6
1948	2,113.7	134.7	2,248.4	1953	2,775.3	146.6	2,921.9
1949	2,118.2	119.4	2,237.6	1954 [2]	2,829.4	130.0	2,959.4

[1] See text footnote 1 at beginning of this chapter.
[2] Preliminary figures.

DEMAND BY PRODUCTS

Since over 99 percent of the indicated consumption of crude oil in continental United States was converted into products at refineries, before sale to ultimate consumers, the analysis of demand trends involves consideration of each of the major products. The fuel oils (residual, distillate, and kerosine) compete directly with natural gas or coal in heating, cooking, and industrial uses. Gasoline is a major fuel in the transportation field. The other products serve a wide variety of uses; some compete with other oil products as fuels, and others have special uses outside the fuel field. Because of the rapid increase in the military use of jet fuel (a blend of low-grade gasoline, kerosine, and distillate), data for that product have been compiled separately since 1951.

Gasoline.—Gasoline represented 43.0 percent of the total demand for all oils in 1954 and 42.6 percent in 1953. Aviation gasolines and commercial naphthas are included in the total, but the low-grade gasoline used as a constituent of jet fuel is not. Although the total demand for gasoline set a new record in 1954, the rate of increase was only 2.3 percent, with a 9.1-percent decline in exports and a 2.7-percent increase in domestic demand. The gain of about 3 million barrels in the exports of aviation gasoline was offset by a sharp decline of 7 million barrels in the exports of other grades. In 1954, 83.3 percent of the total domestic demand for gasoline was for highway use, 5.2 percent for aviation, and 11.5 percent for other uses (including commercial naphthas, farm tractor fuel, military motor gas, other purposes, and losses). Demand for highway use increased 3.6 percent in 1954, whereas the domestic demand for aviation gasoline declined 8.1 percent because of a sharp decline in active military operations and the increased use of jet fuels.

Residual Fuel Oil.—The total demand for residual fuel oil represented 18.5 percent of the total demand for all oils in 1954, compared with 20.1 percent in 1953. Demand in 1954 declined 6.4 percent, with a 3.3-percent gain in exports and a 6.8-percent decline in domestic demand. The domestic demand for residual fuel oil is affected more by variations in industrial activity than any other oil product. Of a total decline of 38 million barrels in domestic demand in 1954, use in public utility electric plants declined 15 million barrels, railroad use dropped 12 million barrels, general manufacturing use declined 6 million, and vessel-fuel use declined 5 million barrels. The refinery production of residual has consistently declined since 1951, dropping

33 million barrels in 1954. Yields from crude oil have been declining about 1 percent a year because of improved refinery methods and the fact that residual usually sells for less than crude oil delivered at the refinery.

Distillate Fuel Oil.—Total demand for distillate fuel oil (including light diesel oils) represented 18.6 percent of the total demand for all oils in 1954, compared with 17.8 percent in 1953, Total demand for distillate increased 5.8-percent in 1954, including a 25.1-percent decline in exports and a 7.8-percent increase in domestic demand. The main gain was in heating, owing to colder weather in 1954 than 1953, and to increased installations. Heating oils represented 57.9 percent of total domestic demand for distillate in 1954 compared with 54.7 percent in 1953. Changes in all other uses were comparatively small.

Kerosine.—The total demand for kerosine represented 4.2 percent of the total demand for all oils in both 1954 and 1953. The gain in total demand in 1954 was 1.1 percent, including a decline of 32.5 percent in exports and an increase of 3.3 percent in domestic demand. About 72 percent of the domestic sales was for use as range oil, including cooking, water heating, and small space heating. No. 1 distillate and liquefied gases can be substituted in many uses, and the increase in electric lighting has cut into the demand for lamp oil.

Other Products.—The total demand for all other products including crude-oil exports, represented 15.7 percent of the total demand for all oils in 1954 compared with 15.4 percent in 1953. The exports of crude oil declined about 32 percent, whereas the exports of the other refined oils increased about 12 percent. The increase in the domestic demand for the other products was about 4.4 percent in 1954, including increases of 33 percent for jet fuels, 12 percent for petroleum coke, and 6 percent for asphalt and a 5 percent decline for lubricants.

Shipments to United States Territories and Possessions.—Domestic demand, as used in this chapter, relates to demand in continental United States only. Shipments from the United States to the Territories and possessions are included with exports and any foreign receipts in such areas are deleted from the total imports shown. Table 4 shows the total shipments of oil into these areas from continental United States and from foreign countries.

The indicated new supply of all oils in the Territories and possessions decreased from 22.7 million barrels in 1953 to 22.4 million in 1954. If reexports to foreign countries are deducted, the indicated demand in these areas was about 22.3 million barrels in 1953 and 22.0 million in 1954.

WORLD OIL SUPPLY

The relative position of the United States in world production and refining of crude petroleum has continued to decline. The United States produced 46.4 percent of the total in 1954, compared with 49.4 percent in 1953. World crude production increased 4.6 percent in 1954, including a 1.7 percent decline for the United States and a gain of 10.8 percent for other countries.

Crude oil refined in the United States was 51.1 percent of the world total in 1954, compared with 54.1 percent in 1953. Total crude oil refined in 1954 increased 5.2 percent, including a 0.6 percent-decline

TABLE 4.—Imports of petroleum products into United States Territories and possessions, 1953–54 [1]

(Thousand barrels)

	1953			1954 [2]		
	From continental United States	Foreign	Total	From continental United States	Foreign	Total
Gasoline	7,991	130	8,121	7,965	35	8,000
Kerosine	854		854	911		911
Distillate fuel oil	2,985	669	3,654	2,546	1,190	3,736
Residual fuel oil	6,144	3,426	9,570	5,962	3,159	9,121
Lubricants:						
Grease	4		4	3		3
Oil	205		205	184		184
Wax		1	1			
Coke	49		49	62		62
Asphalt	183	47	230	272	27	299
Liquefied gases	47		47	41		41
Total	18,462	4,273	22,735	17,946	4,411	22,357

[1] Source: U. S. Department of Commerce, except for imports to Alaska and Hawaii from continental United States, which are Bureau of Mines data.
[2] Preliminary figures.

in the United States and a 12.0-percent gain in other countries. The output of refineries in West Europe increased 15 percent in 1954 compared with gains of 15 percent in 1953, 26 percent in 1952, and 44 percent in 1951. The expansion of refining in this area has been so rapid as to overcome the effect of the refinery shutdown in Iran in 1951 and to almost eliminate the need for product imports from the United States.

The domestic demand in continental United States and its Territories and possessions was 2,851 million barrels in 1954. Total foreign imports into this area amounted to 388 million barrels, while total exports to foreign countries (including reexports from the Territories) were 112 million barrels, indicating a net import of 276 million barrels, including 226 million barrels of crude oil and 50 million barrels of products in 1954.

SCOPE OF REPORT

This report deals primarily with the production, refining, distribution, and indicated consumption of crude petroleum and refined products in continental United States. The objective of the continental balance is to permit a breakdown of operations by States and districts. The increasing volume of light oils recovered from natural gas has made it necessary to include these oils with the crude-oil data, since they are either blended with refinery products or are identical with materials recovered from refinery gases. These light oils are recovered at special plants away from the oil refineries.

The major part of the data was compiled by the Bureau of Mines from detailed reports submitted, on a voluntary basis, by the companies operating various branches of the industry. Most of the data are published monthly and released about 6 weeks after the end of the month. Complete coverage, with only minor estimates, is procured for production, stocks, and refinery operations. The

Bureau of Mines uses the import data for crude oil and unfinished oils as reported by the refineries. Other product imports and all export data were taken from the records of the United States Department of Commerce.

Since it is impossible to contact many of the small producers, the only feasible method of obtaining current monthly data for crude-oil production is from reports by the pipeline companies. Their reports show, by States of origin, stocks on leases, oil taken from the leases, pipeline and tank-farm stocks, and crude deliveries. These data are cross-checked by reports of crude receipts from the refineries, by States of origin and method of transportation. These reports include information covering final receipts by boat, tank car, and trucks and cover stocks of crude oil, by States of origin, held at refineries. These data are checked further against any available current and annual production figures collected by State agencies and supplemented by estimates of unreported lease stocks. The Bureau of Mines crude-production data include some field condensate dumped in crude lines that cannot be identified when received at refineries and is included with the crude runs reported.

Monthly refinery operations reported by individual refineries show input and output and receipts, stocks at the first and end of the month, refinery production, and deliveries. Data on both product stocks at refineries and pipeline and bulk terminal stocks are collected.

Annual canvasses provide supplemental information on the value of crude petroleum at the well, the number of producing oil wells, the sales of fuel oils by uses, and refinery capacity. The table showing world production of crude oil by countries is based on monthly reports that also include additional data on crude movements and refinery operations. Data on crude reserves, wells drilled, and current prices were taken from sources indicated in the footnotes.

RESERVES

The committee on petroleum reserves of the American Petroleum Institute estimated proved reserves of crude oil in the United States on December 31, 1954, to be 29.6 billion barrels. These estimates include only oil recoverable under existing economic and operating conditions.

The increase in net crude reserves in 1954 was 616 million barrels. New reserves added in 1954 were estimated to be 2,873 million barrels, of which 538 million represented revisions of previous estimates, 1,749 million extensions of old pools, and 586 million new reserves discovered in 1954 in new fields and in new pools in old fields. The subtraction of the estimated production of 2,257 million barrels in 1954 indicates the net increase in reserves.

As of December 31, 1954, Texas had 51 percent of total estimated reserves, California 13 percent, Louisiana 10 percent, and Oklahoma 7 percent, or 81 percent for the 4 States combined.

The largest increases in reserves in 1954 were 203 million barrels for Oklahoma, 202 million for Louisiana, 65 million for Kansas, 63 million for Montana, 62 million for Mississippi, 34 million for Illinois, and 24 million for Wyoming.

TABLE 5.—Estimates of proved reserves in the United States, on Dec. 31, 1947–54, by States [1]

(Million barrels)

State	1947	1948	1949	1950	1951	1952	1953	1954
Eastern States:								
Illinois	355	393	468	564	646	619	625	658
Indiana	46	49	50	57	51	56	62	67
Kentucky	65	59	56	56	59	56	82	85
Michigan	70	69	66	79	64	57	61	60
New York	71	67	63	59	57	53	49	46
Ohio	29	29	28	27	26	27	32	37
Pennsylvania	123	110	103	106	95	122	111	102
West Virginia	36	37	38	39	39	37	36	37
Total	795	813	872	987	1,037	1,027	1,058	1,092
Central and Southern States:								
Arkansas	297	300	297	342	337	352	358	351
Kansas	563	674	738	732	792	917	913	979
Louisiana	1,791	1,869	1,910	2,185	[2] 2,285	[2] 2,558	[2] 2,760	[2] 2,962
Mississippi	304	365	403	386	385	359	350	412
New Mexico	530	552	592	592	612	733	815	806
Oklahoma	953	1,250	1,330	1,397	1,476	1,558	1,752	1,955
Texas	11,777	12,484	13,510	13,582	[2] 15,315	[2] 14,916	[2] 14,999	[2] 14,982
Total	16,215	17,494	18,780	19,216	21,202	21,393	21,947	22,447
Mountain States:								
Colorado	382	366	345	339	325	306	319	329
Montana	115	119	112	111	108	156	209	272
Utah	-------	1	16	22	30	42	38	36
Wyoming	679	716	692	841	973	1,065	1,279	1,304
Total	1,176	1,202	1,165	1,313	1,436	1,569	1,845	1,941
Pacific Coast States: California	3,295	3,764	3,823	3,734	[2] 3,761	[2] 3,854	[2] 3,920	[2] 3,889
Other States [3]	7	7	9	18	32	118	175	192
Total United States	21,488	23,280	24,649	25,268	27,468	27,961	28,945	29,561

[1] From reports of committee on petroleum reserves, American Petroleum Institute. Includes crude oil that may be extracted by present methods from fields completely developed or sufficiently explored to permit reasonably accurate calculations. The change in reserves during any year represents total new discoveries, extensions, and revisions, minus production.

[2] Includes offshore reserves.

[3] Includes Alabama, Florida, Missouri, Nebraska, Nevada, North Dakota, South Dakota, Tennessee, and Virginia.

CRUDE PETROLEUM

SUPPLY AND DEMAND

The new supply of crude petroleum in the United States comes primarily from domestic production but has been augmented by increasing imports. The relationship of crude imports to total crude supply has risen from 7.4 percent in 1951 to 9.1 percent in 1953 and 9.4 percent in 1954.

The principal changes in total crude supply and demand in 1954, compared with 1953, were a 1.7-percent decline in crude production and a 1-3-percent increase in imports; a decline of 16.1 million barrels of total crude stocks in 1954 compared with an increase of 2.5 million in 1953; a decline of 0.7 percent in total demand for crude oil and a decrease of 0.6 percent in total crude run to stills; and a decrease of 32.0 percent in crude exports. The major part of the indicated demand for crude petroleum must be converted into products before final consumption and, in both 1953 and 1954, almost 98 percent of the total was refined and the small remainder represented exports, crude used direct for fuel, and losses.

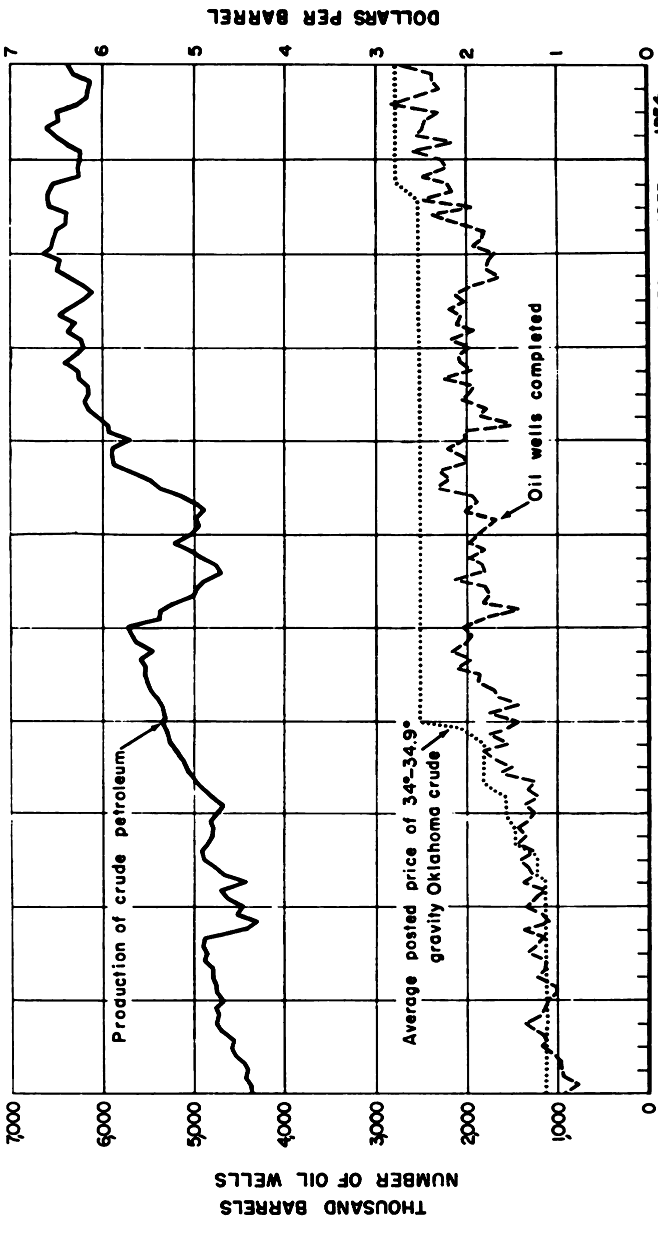

FIGURE 2.—Daily average production of crude petroleum, total number of oil wells completed, and average listed price per barrel of a selected grade of Oklahoma crude petroleum in the United States, 1944–54, by months.

The proper evaluation of crude production and refinery runs must take into consideration the changes in crude stocks and in refined product stocks. Production and runs were inflated above requirements in 1953 by an abnormal increase of almost 47 million barrels in product stocks compared with a gain of less than 2 million in 1954. In 1954, crude production was less than demand because of a reduction of 16 million barrels in stocks of domestic crude oil.

TABLE 6.—Supply and demand[1] for crude petroleum in continental United States, 1950–54

(Thousand barrels)

	1950	1951	1952	1953	1954[2]
Production	1,973,574	2,247,711	2,289,836	2,357,082	2,316,323
Imports[3]	177,714	179,073	209,591	236,455	239,479
Total new supply	2,151,288	2,426,784	2,499,427	2,593,537	2,555,802
Increase (+) or decrease (—) in stocks	—4,893	7,320	16,145	2,517	—16,060
Demand:[1]					
Domestic crude	1,979,764	2,237,305	2,276,691	2,357,423	2,332,604
Foreign crude	176,417	182,159	206,591	233,597	239,258
Total demand	2,156,181	2,419,464	2,483,282	2,591,020	2,571,862
Runs to stills:					
Domestic	1,918,854	2,188,677	2,235,198	2,321,820	2,300,766
Foreign	176,013	181,727	206,061	233,045	238,798
Exports[4]	34,823	28,604	26,696	19,931	13,564
Transfers to fuel oil:[1]					
Distillate	2,537	2,863	2,705	1,966	1,500
Residual	5,325	6,006	6,343	5,617	5,924
Other fuel uses and losses	18,629	11,587	6,279	8,641	11,310
Total demand	2,156,181	2,419,464	2,483,282	2,591,020	2,571,862

[1] For definition, see text footnote 1 at the beginning of this chapter
[2] Preliminary figures.
[3] Bureau of Mines data.
[4] U. S. Department of Commerce.

PRODUCTION

General

Production of crude petroleum amounted to 2,316 million barrels in 1954, a drop of about 41 million barrels or 1.7 percent less than the record established in 1953. There was no change in the rank of the 5 leading States (Texas, California, Louisiana, Oklahoma, and Kansas) that produced over 100 million barrels each and supplied 81.6 percent of total production in 1954 (table 10). Texas, with 51 percent of total crude reserves, produced 42.4 percent of the national output.

The output of the next 6 States (Wyoming, New Mexico, Illinois, Colorado, Mississippi, and Arkansas, in order of importance), producing 20 million barrels or more each, but less than 100 million, represented 14.7 percent of the national output in 1954.

These 11 States produced 96 percent of the total output in both 1954 and 1953.

TABLE 7.—Supply and demand for crude petroleum in continental United States, 1953–54

(Thousand barrels)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Supply: Production	203, 211	183, 183	202, 024	191, 953	198, 117	197, 630	204, 711	204, 490	196, 571	193, 726	188, 116	193, 350	2, 357, 082
Imports [1]	19, 098	16, 400	20, 320	18, 839	21, 677	21, 207	19, 513	20, 847	20, 757	19, 806	19, 444	18, 547	236, 455
Total supply	222, 309	199, 583	222, 344	210, 792	219, 794	218, 837	224, 224	225, 337	217, 328	213, 532	207, 560	211, 897	2, 593, 537
Change in stocks: Domestic	+439	+1, 423	+1, 238	+3, 435	−2, 286	+2, 895	+1, 009	+1, 031	+3, 287	−1, 839	−5, 226	−5, 747	−341
Foreign	−117	−84	+838	−157	+1, 918	+274	+162	−280	+741	−365	+553	−625	+2, 858
Demand: Domestic	202, 772	181, 760	200, 786	188, 518	200, 403	194, 735	203, 702	203, 459	193, 284	195, 565	193, 342	199, 097	2, 357, 423
Foreign	19, 215	16, 484	19, 482	18, 996	19, 759	20, 933	19, 351	21, 127	20, 016	20, 171	18, 891	19, 172	233, 597
Runs to stills: Domestic	199, 100	178, 689	197, 741	184, 532	197, 340	191, 542	200, 875	200, 947	190, 693	192, 871	190, 744	196, 746	2, 321, 820
Foreign	19, 188	16, 444	19, 332	18, 893	19, 734	20, 891	19, 322	21, 101	19, 993	20, 146	18, 855	19, 146	233, 045
Exports [2]	2, 211	2, 011	2, 171	2, 833	1, 611	1, 824	1, 232	1, 321	1, 109	1, 178	1, 052	1, 378	19, 931
Transfers: Distillate	233	189	176	151	145	143	166	170	143	155	144	151	1, 966
Residual	536	406	483	446	502	481	500	500	516	429	387	431	5, 617
Losses	719	505	365	659	830	787	958	547	846	957	1, 051	417	8, 641
1954 [3]													
Supply: Production	193, 453	178, 603	201, 702	198, 440	200, 593	195, 000	194, 037	191, 190	184, 527	190, 198	190, 367	198, 213	2, 316, 323
Imports [1]	19, 141	17, 395	20, 260	17, 229	21, 957	18, 728	22, 448	20, 589	20, 168	19, 893	19, 082	22, 589	239, 479
Total supply	212, 594	195, 998	221, 962	215, 669	222, 550	213, 728	216, 485	211, 779	204, 695	210, 091	209, 449	220, 802	2, 555, 802
Change in stocks: Domestic	−5, 914	−4, 097	+4, 256	+8, 621	+201	+3, 759	+716	−4, 112	−4, 753	−5, 184	−3, 122	−6, 652	−16, 281
Foreign		+195	+735	−186	+1, 794	−921	−939	−624	−674	+28	+342	+471	+221
Demand: Domestic	199, 367	182, 700	197, 446	189, 819	200, 392	191, 241	193, 321	195, 302	189, 280	195, 382	193, 489	204, 865	2, 332, 604
Foreign	19, 141	17, 200	19, 525	17, 415	20, 163	19, 649	23, 387	21, 213	20, 842	19, 865	18, 740	22, 118	239, 258
Runs to stills: Domestic	196, 264	180, 746	195, 136	186, 956	198, 053	188, 822	191, 040	191, 516	187, 310	192, 039	190, 570	202, 314	2, 300, 766
Foreign	19, 102	17, 168	19, 484	17, 380	20, 125	19, 586	23, 362	21, 192	20, 845	19, 812	18, 674	22, 068	238, 798
Exports [2]	1, 588	795	873	1, 418	1, 258	1, 372	1, 073	1, 349	509	1, 485	1, 047	797	13, 564
Transfers: Distillate	150	128	143	135	138	119	123	112	105	113	119	115	1, 500
Residual	397	452	461	531	535	465	543	564	481	530	481	484	5, 924
Losses	1, 007	611	874	814	446	526	567	1, 782	872	1, 268	1, 338	1, 205	11, 310

[1] Bureau of Mines.
[2] U. S. Department of Commerce, except Alaska and Hawaii, which are Bureau of Mines data.
[3] Preliminary figures.

TABLE 8.—Petroleum produced in the United States, 1950–54, and total, 1859–1954, by States[1]

(Thousand barrels)

	1950	1951	1952	1953	1954[2]	1859–1954 (total)
Production:						
Alabama	735	1,020	1,279	1,694	1,584	8,240
Arkansas	31,108	29,798	29,440	29,681	29,206	914,227
California	327,607	354,561	359,450	365,085	355,779	10,054,473
Colorado	23,303	27,823	30,381	36,402	41,052	282,652
Florida	487	596	591	543	548	3,858
Illinois	62,028	60,243	60,089	59,026	66,998	1,752,672
Indiana	10,699	11,100	12,037	12,823	11,204	247,887
Kansas	107,586	114,522	114,807	114,566	119,317	[3] 2,589,090
Kentucky	10,381	11,622	11,918	11,518	13,791	[4] 301,095
Louisiana	208,965	232,281	243,929	256,632	246,093	3,539,951
Michigan	15,826	13,927	13,251	12,285	12,027	[5] 373,737
Mississippi	38,236	37,039	36,310	35,620	33,591	426,619
Montana	8,109	8,958	9,606	11,920	13,687	212,422
Nebraska	1,547	2,558	2,660	6,344	7,423	26,369
Nevada	----------	----------	----------	----------	33	33
New Mexico	47,367	52,719	58,681	70,441	75,200	[6] 939,436
New York	4,143	4,254	4,242	3,800	3,257	[7] 182,154
North Dakota	----------	25	1,549	5,183	5,979	12,736
Ohio	3,383	3,140	3,350	3,610	3,829	634,928
Oklahoma	164,599	186,869	190,435	202,570	186,349	7,001,332
Pennsylvania	11,859	11,345	11,233	10,649	9,107	1,177,907
Texas	829,874	1,010,270	1,022,139	1,019,164	981,722	17,756,154
Utah	1,228	1,305	1,737	1,807	1,873	[8] 8,603
West Virginia	2,808	2,757	2,602	3,038	2,902	452,259
Wyoming	61,631	68,929	68,074	82,618	93,633	1,229,052
Other States[9]	65	50	46	63	139	2,154
Total	1,973,574	2,247,711	2,289,836	2,357,082	2,316,323	50,130,040
Value at wells:						
Total (thousands of dollars)	4,963,380	5,690,410	5,785,230	6,327,100	6,427,140	82,520,738
Average per barrel	$2.51	$2.53	$2.53	$2.68	$2.77	$1.65

[1] For detailed figures by States, 1859–1935, see Minerals Yearbook, 1937, p. 1008.
[2] Preliminary figures.
[3] Oklahoma included with Kansas in 1905 and 1906.
[4] Includes Tennessee, 1883–1907.
[5] Figures represent 1925–54 production only; earlier years included under "Other States."
[6] Figures represent 1924–54 production only; earlier years included under "Other States."
[7] Early production in New York included with Pennsylvania.
[8] Figures represent 1948–54 production only; earlier years included under "Other States."
[9] Includes Alaska, 1912–33; Arkansas, 1920; Michigan, 1900–19; Mississippi, 1933–35; Missouri, 1899–1911, 1913–16, 1919–23, 1932–54; New Mexico, 1913, 1919–23; Tennessee, 1916–54; Utah, 1907–11, 1920, 1924–41; Virginia, 1943–54.

Six States (Texas, Louisiana, Oklahoma, Kansas, New Mexico, and Arkansas) issued monthly proration orders under State conservation laws to adjust production to market demand, and these States produced 71 percent of the total crude oil in 1954.

The most significant changes in production in 1954 were increases of 17 percent for Illinois, 15 percent for Colorado, 13 percent for Wyoming, 7 percent for New Mexico, and 4 percent for Kansas; whereas production declined 8 percent in Oklahoma, 4 percent in Louisiana and Texas, and 3 percent in California.

TABLE 9.—Production of crude petroleum in the United States in 1953–54, by States and months

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Alabama	133	132	147	146	154	146	150	146	141	134	132	133	1,694
Arkansas	2,511	2,270	2,526	2,449	2,458	2,451	2,572	2,560	2,554	2,505	2,377	2,448	29,681
California [1]	30,621	27,706	31,019	29,862	31,107	30,340	31,192	30,950	30,048	31,011	30,205	31,024	365,085
Colorado	2,760	2,581	2,797	2,910	3,094	3,111	3,307	3,290	3,141	3,096	3,015	3,300	36,402
Florida	45	43	46	45	48	44	47	48	45	41	45	46	543
Illinois	4,998	4,611	4,891	4,882	4,908	4,800	4,903	4,889	4,786	5,075	4,991	5,292	59,026
Indiana	1,064	986	1,092	1,085	1,131	1,092	1,108	1,100	1,047	1,068	1,018	1,032	12,823
Kansas	10,377	9,421	10,378	9,813	9,842	9,695	10,238	10,137	9,717	6,575	9,047	9,326	114,566
Kentucky	925	850	940	931	934	957	1,000	1,009	972	1,001	969	1,030	11,518
Louisiana	21,917	20,016	22,274	21,295	21,474	21,266	21,919	22,030	21,362	20,606	20,901	21,572	256,632
Michigan [2]	1,058	971	1,033	1,033	1,011	1,023	1,048	1,018	1,006	1,040	994	1,050	12,285
Mississippi	3,080	2,854	3,110	2,991	3,033	2,922	2,999	3,030	2,887	2,904	2,855	2,955	35,620
Montana [3]	916	824	933	914	1,029	977	1,059	1,016	998	1,082	1,056	1,116	11,920
Nebraska	483	433	524	470	503	520	567	580	507	585	566	606	6,344
New Mexico	5,530	5,112	5,795	5,676	5,978	5,802	6,036	6,185	6,081	6,323	5,840	6,083	70,441
New York	336	308	328	324	322	324	328	309	315	308	282	316	3,800
North Dakota	439	479	432	427	440	417	431	448	391	397	434	448	5,183
Ohio	276	246	294	279	295	304	322	311	312	329	308	334	3,610
Oklahoma	16,998	15,490	17,408	16,703	17,249	17,223	17,844	17,989	17,270	16,518	15,615	16,263	202,570
Pennsylvania	901	822	917	903	891	903	917	893	897	923	825	857	10,649
Texas	91,000	80,998	88,192	81,984	85,140	86,058	88,942	88,643	84,252	84,276	79,181	80,498	1,019,164
Utah	155	153	166	163	163	148	139	152	142	144	138	144	1,807
West Virginia	214	196	221	234	245	251	270	260	279	289	287	292	3,038
Wyoming	6,469	5,677	6,556	6,429	6,663	6,851	7,367	7,492	7,416	7,491	7,030	7,177	82,618
Other States	5	4	5	5	5	5	6	5	5	5	5	8	[4] 63
Total: 1953	203,211	183,183	202,024	191,953	198,117	197,630	204,711	204,490	196,571	193,726	188,116	193,350	2,357,082
1952	192,848	184,818	197,121	192,936	157,748	185,692	188,985	192,768	195,603	201,581	193,832	205,904	2,289,836
Daily average, 1953	6,555	6,542	6,517	6,398	6,391	6,588	6,604	6,596	6,552	6,249	6,271	6,237	6,458
Pennsylvania Grade (included above)	1,556	1,423	1,579	1,572	1,558	1,593	1,634	1,570	1,597	1,634	1,495	1,581	18,792
1954 [5]													
Alabama	143	131	139	130	136	134	133	122	134	130	123	129	1,584
Arkansas	2,436	2,307	2,556	2,445	2,522	2,460	2,646	2,374	2,302	2,370	2,393	2,395	29,206
California	30,998	27,933	30,651	29,600	30,533	29,352	30,023	29,680	28,803	29,720	28,741	29,745	355,779
Colorado	2,738	2,767	3,150	3,183	3,694	3,716	3,654	3,611	3,429	3,610	3,741	3,759	41,052
Florida	46	44	47	39	54	46	48	49	43	46	42	44	548
Illinois	5,160	4,951	5,474	5,413	5,607	5,675	5,546	5,474	5,453	6,033	6,018	6,194	66,998
Indiana	1,008	923	998	952	964	901	899	919	870	903	920	947	11,204
Kansas	9,437	9,199	10,438	10,107	10,218	10,093	10,304	9,938	9,642	9,951	9,908	10,082	119,317
Kentucky	1,066	1,041	1,181	1,140	1,146	1,168	1,148	1,139	1,150	1,205	1,190	1,217	13,791

See footnotes at end of table.

TABLE 9.—Production of crude petroleum in the United States in 1953–54, by States and months—Continued

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
Louisiana	21,595	19,420	21,645	21,586	22,347	21,200	20,456	19,847	18,567	19,449	19,345	20,636	246,093
Michigan	1,015	963	1,040	1,033	1,000	1,021	1,000	1,010	974	978	975	1,018	12,027
Mississippi	2,909	2,639	2,911	2,788	2,861	2,761	2,834	2,752	2,681	2,792	2,756	2,907	33,591
Montana	888	1,002	1,110	1,069	1,077	1,090	1,274	1,265	1,190	1,157	1,218	1,347	13,687
Nebraska	580	555	537	580	588	677	627	623	647	666	638	705	7,423
Nevada	------	------	------	------	------	------	9	6	5	------	6	7	33
New Mexico	6,181	5,570	6,262	6,049	6,270	6,239	6,428	6,401	6,094	6,434	6,659	6,613	75,200
New York	273	257	293	280	273	272	265	267	287	261	262	267	3,257
North Dakota	457	420	468	420	440	406	440	444	436	592	663	793	5,979
Ohio	301	309	336	337	340	345	299	267	302	325	331	337	3,829
Oklahoma	16,176	15,387	17,388	16,936	16,686	14,549	14,627	15,098	14,470	14,864	14,769	15,399	186,849
Pennsylvania	836	709	835	811	790	791	770	754	728	704	682	697	9,107
Texas	81,266	75,042	85,980	85,498	84,791	83,637	81,728	80,406	78,206	79,943	80,939	84,286	981,722
Utah	144	157	174	160	163	162	160	133	160	153	150	157	1,873
West Virginia	266	240	260	239	226	248	242	254	246	229	230	222	2,902
Wyoming	7,527	6,629	7,814	7,634	7,852	8,045	8,466	8,343	7,696	7,673	7,656	8,298	93,633
Other States	7	8	15	11	15	12	11	14	12	10	12	12	[6] 139
Total: 1954	193,453	178,603	201,702	198,440	200,593	195,000	194,037	191,190	184,527	190,198	190,367	198,213	2,316,323
1953	203,211	183,183	202,024	191,953	198,117	197,630	204,711	204,490	196,571	193,726	188,116	193,350	2,357,082
Daily average	6,240	6,379	6,507	6,615	6,471	6,500	6,259	6,167	6,151	6,135	6,346	6,394	6,346
Pennsylvania Grade (included above)	1,472	1,313	1,504	1,444	1,404	1,416	1,391	1,382	1,346	1,310	1,280	1,286	16,548

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[1] American Petroleum Institute.
[2] Department of Conservation, Michigan.
[3] Montana Oil Conservation Board.
[4] Missouri (39), Tennessee (16), and Virginia (8).
[5] Preliminary figures.
[6] Missouri (78), South Dakota (34), Tennessee (17), and Virginia (10).

TABLE 10.—Percentage of total crude petroleum produced in the United States, 1945–54, by States

State	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954[1]
Texas	44.0	43.8	44.2	44.7	40.4	42.1	45.0	44.6	43.2	42.4
California	19.1	18.2	17.9	16.8	18.1	16.6	15.8	15.7	15.5	15.4
Louisiana	7.7	8.3	8.6	9.0	10.4	10.6	10.3	10.7	10.9	10.6
Oklahoma	8.1	7.8	7.6	7.7	8.2	8.3	8.3	8.3	8.6	8.0
Kansas	5.6	5.6	5.7	5.5	5.5	5.5	5.1	5.0	4.9	5.2
Illinois	4.4	4.3	3.6	3.2	3.5	3.1	2.7	2.6	2.5	2.9
Wyoming	2.1	2.2	2.4	2.7	2.6	3.1	3.1	3.0	3.5	4.0
New Mexico	2.2	2.1	2.2	2.4	2.6	2.4	2.3	2.6	3.0	3.2
Mississippi	1.1	1.4	1.9	2.3	2.1	1.9	1.7	1.6	1.5	1.4
Arkansas	1.7	1.6	1.6	1.6	1.6	1.6	1.3	1.3	1.3	1.3
Colorado	.3	.7	.8	.9	1.3	1.2	1.2	1.3	1.5	1.8
Michigan	1.0	1.0	.9	.8	.9	.8	.6	.6	.5	.5
Pennsylvania	.7	.8	.7	.6	.6	.6	.5	.5	.4	.4
Kentucky	.6	.6	.5	.4	.5	.5	.5	.5	.5	.6
Other States	1.4	1.6	1.4	1.4	1.7	1.7	1.6	1.7	2.2	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Preliminary figures.

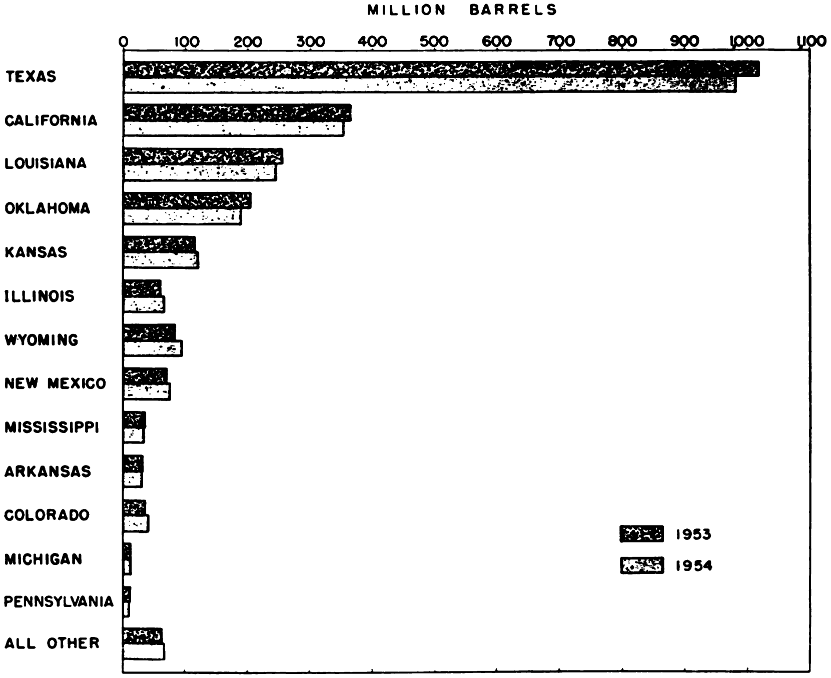

FIGURE 3.—Production of crude petroleum in the United States, 1953–54, by States.

TABLE 11.—Production of crude petroleum in leading fields in the United States, 1953–54, and total production since discovery, in thousand barrels [1]

[Oil and Gas Journal]

Field	State	1953	1954	Total since discovery [2]
East Texas	Texas	90, 627	75, 662	3, 149, 441
Wilmington	California	44, 334	41, 589	691, 731
Spraberry Trend area [3]	Texas	17, 015	39, 968	96, 351
Ventura Avenue	California	30, 365	31, 189	509, 767
Coalinga	do	25, 170	23, 488	706, 769
Hawkins	Texas	18, 754	22, 954	190, 187
Rangely	Colorado	22, 954	22, 472	165, 332
Huntington Beach	California	21, 167	21, 446	543, 864
Kelly-Snyder	Texas	25, 549	17, 035	133, 195
Katy-North	do	8, 751	15, 494	77, 960
Wasson	do	19, 160	15, 422	290, 780
Goldsmith	do	18, 663	14, 577	185, 916
Midway-Sunset	California	12, 529	13, 443	798, 421
Keystone-South	Texas	10, 990	13, 210	135, 434
Cuyama-South	California	12, 770	12, 748	63, 369
Hastings	Texas	13, 865	11, 550	253, 259
Slaughter	do	13, 591	11, 370	210, 270
San Ardo	California	11, 159	11, 170	34, 268
Seeligson	Texas	12, 666	10, 670	133, 315
Denton	New Mexico	8, 668	10, 651	25, 238
Webster	Texas	12, 585	10, 392	201, 687
Sholem-Alechem	Oklahoma	12, 736	10, 261	112, 854
Bradford-Allegany [4]	Pennsylvania-New York	12, 133	10, 045	648, 528
Conroe-West	Texas	12, 130	10, 001	342, 410
Levelland	do	11, 410	9, 992	81, 852
Yates	do	12, 271	9, 903	420, 640
Tom O'Connor	do	11, 775	9, 696	206, 511
Clay City	Illinois	8, 065	9, 526	168, 037
Weeks Island	Louisiana	11, 304	9, 076	49, 877
Eunice-Monument	New Mexico	9, 321	9, 029	257, 454
Thompson	Texas	10, 714	9, 002	197, 147
Diamond M	do	10, 592	8, 920	49, 344
Elk Basin-South	Wyoming-Montana	9, 733	8, 780	94, 576
Van	Texas	10, 827	8, 773	251, 895
Cowden-North and South	do	9, 219	8, 595	147, 833
Velma-West	Oklahoma	15, 533	8, 435	112, 959
Brea-Olinda	California	8, 625	8, 411	237, 078
Caillou Island	Louisiana	8, 585	8, 388	86, 632
Caddo	do	5, 451	8, 319	213, 611
T-X-L	Texas	10, 476	8, 277	122, 904
Buena Vista	California	8, 853	7, 988	440, 404
Elk Hill	do	6, 002	7, 715	223, 763
Long Beach	do	7, 434	7, 654	781, 431
Howard-Glasscock	Texas	6, 657	7, 488	169, 370
Coles Levee-North and South	California	7, 769	7, 427	106, 608
Aqua Dulse-Stratton	Texas	7, 622	6, 975	119, 974
Dollarhide	do	8, 259	6, 728	45, 671
McElroy	do	7, 250	6, 718	241, 044
Cogdell	do	8, 171	6, 558	33, 386
Fullerton-North and South	do	7, 862	6, 513	105, 208
Louden	Illinois	5, 249	6, 486	180, 458
Kettleman-North Dome	California	6, 657	6, 049	402, 199
Cat Canyon-West	do	6, 971	5, 991	71, 801
Edison	do	5, 094	5, 831	62, 715
Pegasus	Texas	5, 706	5, 778	20, 608
Delhi-Big Creek	Louisiana	7, 152	5, 714	74, 303
Kern-Bluff-Front and River	California	7, 518	5, 630	413, 811
Andector	Texas	6, 691	5, 580	39, 272
Seminole and West	do	6, 673	5, 459	82, 189
Jameson	do	4, 425	5, 445	20, 761
Trapp	Kansas	6, 081	5, 461	148, 836
West Ranch	Texas	6, 773	5, 425	90, 902
Hull-Merchant	do	4, 411	5, 392	130, 953
Elk City	Oklahoma	6, 380	5, 348	32, 239
Chase-Silica	Kansas	6, 007	5, 339	180, 512
Fort Chadbourne	Texas	5, 183	5, 275	15, 487
Anahuac	do	6, 554	5, 241	127, 533
Baxterville	Mississippi	6, 035	5, 230	45, 176
Clareton-South	Wyoming	1, 076	5, 197	6, 847
Santa Fe Springs	California	5, 337	5, 185	554, 366
Block 31	Texas	5, 204	5, 182	26, 164
Coyote-East and West	California	5, 654	5, 069	251, 663
Old Ocean	Texas	6, 048	5, 015	86, 698

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[1] The classification of fields and data may differ from other sources used in the State summaries.

[2] Includes revisions.

[3] Includes all acreage proved in Spraberry south of north line of Midland County, except Benedum, in District 7C and 8.

[4] Bureau of Mines data.

Crude Production by States

Colorado.—Both development and exploratory drilling increased tremendously in 1954 in Colorado, chiefly in the Denver Basin. In the Adena field alone 168 wells were drilled, and proved reserves of the field approached 60 million barrels. All discoveries in the Denver Basin were confined to the Cretaceous.

TABLE 12.—Production of crude petroleum in Arkansas, 1950–54, by fields

(Thousand barrels)

Field	1950	1951	1952	1953	1954 [1]
Atlanta	999	841	810	649	554
Buckner	798	719	722	645	529
Dorcheat-Macedonia	983	875	877	841	624
Fouke	894	929	1,053	1,429	1,210
Horsehead	-----	-----	29	194	706
Magnolia	4,547	4,407	4,223	4,029	3,289
McKamie	1,179	1,175	1,446	1,369	1,480
Midway	2,786	2,684	2,674	2,642	2,262
Schuler	2,854	2,626	2,377	2,318	2,599
Smackover	3,991	3,910	3,814	3,892	4,370
Stephens	1,774	1,476	1,308	1,223	1,077
Village	1,677	1,247	1,018	840	850
Wesson	3,452	3,647	3,510	3,296	2,699
Other fields [2]	5,174	5,262	5,579	6,314	6,957
Total Arkansas	31,108	29,798	29,440	29,681	29,206

[1] Preliminary figures.

[2] Includes oil consumed on leases and net change in stocks held on leases for entire State.

TABLE 13.—Production of crude petroleum in California, 1950–54, by districts and fields, in thousand barrels

[American Petroleum Institute]

District and field	1950	1951	1952	1953	1954 [1]
San Joaquin Valley:					
Belridge	2,931	3,516	3,237	3,567	4,015
Buena Vista	12,032	11,168	9,753	8,881	7,962
Coalinga	31,210	31,957	30,344	28,356	27,575
Coles Levee	7,207	7,224	7,007	6,785	6,462
Cuyama-Russell Ranch	16,504	21,230	19,805	17,409	16,769
Edison	3,914	4,867	5,489	5,057	4,419
Elk Hills	2,700	2,459	2,836	5,960	7,696
Fruitvale	2,827	3,312	3,372	3,562	3,576
Gosford East	680	831	802	652	488
Greeley	4,061	4,615	4,739	4,769	4,531
Helm	819	728	545	540	555
Kern River-Kern Bluff-Kern Front	6,461	7,984	7,790	7,500	5,610
Kettleman North Dome	10,467	9,090	7,984	6,657	6,041
Lost Hills	2,019	2,084	2,161	2,317	1,982
McKittrick	5,774	6,309	7,148	8,621	7,764
Midway-Sunset	11,431	12,619	12,309	12,512	13,362
Mountain View	1,240	1,173	1,303	1,372	1,356
Mount Poso	3,809	3,451	3,276	3,100	3,078
Poso Creek	830	1,196	1,405	1,767	1,323
Raisin City	1,613	1,749	1,790	1,854	1,944
Rio Bravo	3,748	4,089	4,335	4,415	4,313
Riverdale	780	781	789	677	611
Round Mountain	2,167	2,056	2,015	1,915	1,793
Tejon Group	795	2,078	2,363	2,366	2,418
Ten Section	2,076	1,877	1,621	1,472	1,438
Other San Joaquin Valley	8,002	8,093	8,005	9,006	9,615
Total San Joaquin Valley	146,097	156,536	152,223	151,089	146,696

See footnotes at end of table.

TABLE 13.—Production of crude petroleum in California, 1950–54, by districts and fields, in thousand barrels—Continued

District and field	1950	1951	1952	1953	1954[1]
Coastal district:					
Aliso Canyon	1,455	1,986	2,428	2,640	2,790
Cat Canyon	4,632	6,324	6,700	6,992	6,065
Del Valle	1,261	1,677	1,229	995	1,070
Elwood	2,313	1,920	1,785	1,569	1,436
Gato Ridge	933	1,030	1,076	1,012	973
Lompoc	988	2,482	1,917	1,697	1,493
Newall-Potrero	2,995	2,865	2,851	3,314	3,558
Orcutt	1,362	1,476	1,421	1,354	1,265
Padre Canyon[2]	2,462	2,242	1,549	1,726	1,736
Placerita	5,743	3,982	3,458	2,756	2,171
Ramona	1,757	1,505	1,287	1,047	863
Rincon	1,304	1,319	1,499	1,457	1,517
San Ardo	188	2,745	8,281	11,284	11,172
San Miguelito	2,895	4,464	4,250	3,134	1,990
San Maria	4,509	4,479	4,029	4,191	3,680
South Mountain	2,382	2,207	2,858	4,594	5,261
Ventura	20,985	23,301	27,241	29,901	31,129
Zaca Creek	556	1,648	1,537	1,653	1,709
Other Coastal	4,109	4,953	8,388	12,625	12,720
Total Coastal	62,829	72,605	83,784	93,941	92,598
Los Angeles Basin:					
Brea-Olinda	4,533	5,402	6,928	8,574	8,314
Coyote	5,717	5,895	6,075	5,655	5,087
Dominquez	4,602	4,286	3,893	3,658	3,421
Huntington Beach	20,568	22,465	21,789	21,139	21,556
Inglewood	4,879	4,951	4,984	4,950	4,778
Long Beach	8,432	8,499	7,963	7,422	7,739
Montebello	2,185	2,014	1,916	1,767	1,575
Newport	1,785	1,575	1,494	1,546	1,555
Richfield	2,364	2,425	2,412	2,628	2,738
Rosecrans[3]	1,991	1,640	1,684	1,478	1,360
Sansinena	531	1,038	1,928	2,800	3,062
Santa Fe Springs	5,288	5,132	5,164	5,315	5,141
Seal Beach	4,286	4,118	4,083	3,852	3,545
Torrance	2,615	2,522	2,510	2,564	2,526
Wilmington	46,234	50,806	48,121	44,328	41,540
Other Los Angeles Basin	2,671	2,652	2,499	2,379	2,548
Total Los Angeles Basin	118,681	125,420	123,443	120,055	116,485
Total California	327,607	354,561	359,450	365,085	355,779

[1] Preliminary figures.
[2] Includes Oak Grove area.
[3] Includes Athens.

TABLE 14.—Production of crude petroleum in Colorado, 1950–54, by fields

(Thousand barrels)

Field	1950	1951	1952	1953	1954[1]
Iles	503	447	378	334	302
Little Beaver	----------	----------	(2)	2,529	2,687
Merino	(2)	455	391	411	353
Mount Hope	(2)	239	578	1,125	892
Powder Wash	91	123	257	286	280
Rangely	18,956	22,091	22,443	22,900	22,780
Wilson Creek	2,796	2,795	2,851	2,854	2,640
Yenter	(2)	420	962	1,503	1,120
Other fields[3]	957	1,253	2,521	4,460	9,998
Total Colorado	23,303	27,823	30,381	36,402	41,052

[1] Preliminary figures.
[2] Included in other fields.
[3] Includes crude oil consumed on leases and net change in stocks held on leases for entire State.

Florida.—The Sunniland field had been the only producer, but a second oil field was discovered in southern Florida. The Forty Mile

Bend field was discovered about 50 miles southeast, with production from the same stratigraphic interval as the Sunniland field.

Illinois.—Crude-oil production in Illinois increased to the highest since 1946, primarily because of the growth of water-flood operations and improved hydraulic fracturing techniques.

TABLE 15.—Production of crude petroleum in Illinois, 1950–54, by fields, in thousand barrels

[Oil and Gas Journal]

Field	1950	1951	1952	1953	1954
Albion	1,187	1,231	1,134	1,162	1,088
Benton	436	2,205	3,056	2,441	1,740
Boyd	887	687	557	539	533
Bridgeport	2,012	1,936	1,996	2,531	2,747
Centralia	1,250	946	836	701	634
Clay City	[1] 8,142	7,031	6,993	8,065	9,526
Dale	[2] 1,187	2,215	2,249	2,053	1,808
East Inman	1,050	837	630	539	461
Johnsonville	829	664	678	588	588
Louden	7,436	6,127	5,587	5,249	6,486
Marine	872	787	674	517	408
New Harmony	[3] 2,376	3,504	3,215	3,491	4,736
Phillipstown	829	1,092	1,084	989	868
Robinson	1,532	1,530	1,572	2,045	2,377
Roland	652	601	554	489	1,093
Sailor Springs	1,833	1,445	1,204	1,192	1,473
Salem	3,726	3,404	3,080	2,541	4,981
Other fields	25,867	23,585	24,465	[4] 23,894	[4] [5] 25,451
Total Illinois	62,103	59,827	59,564	[4] 59,026	[5] 66,998

[1] Includes Noble.
[2] Includes Hoodville.
[3] Includes Keensburg.
[4] Bureau of Mines figures.
[5] Preliminary figures.

TABLE 16.—Production of crude petroleum in Kansas, 1950–54, by fields, in thousand barrels

[Oil and Gas Journal]

Field	1950	1951	1952	1953	1954
Bemis-Shutts	4,681	4,287	3,741	3,526	3,549
Bloomer	2,716	2,782	2,344	2,067	1,589
Burnett	2,747	3,044	2,709	[1] 2,303	2,170
Burrton-Haury	1,127	1,026	909	781	809
Chase	3,078	2,786	[2] 7,152	[2] 6,007	[2] 5,339
El Dorado	3,019	3,202	3,454	3,939	3,864
Fairport	1,243	1,135	879	834	823
Geneseo-Edwards	2,960	3,001	3,304	3,061	2,869
Gorham	1,406	2,452	1,990	1,793	1,692
Hall-Gurney	3,159	3,637	3,954	4,640	4,528
Iuka-Carmi	(3)	1,104	1,244	1,314	1,421
Kraft-Prusa	5,870	6,326	5,449	4,721	4,357
Marcotte	(3)	399	1,964	1,831	1,681
Morel	1,337	2,301	2,092	1,798	1,654
Ray	1,484	1,822	1,624	1,393	1,280
Seeley-Wick	956	760	1,292	1,753	1,798
Silica-Raymond	5,147	4,950	(2)	(2)	(2)
Stoltenberg	1,962	1,760	1,471	1,270	1,119
Thrall-Agard	615	1,324	1,650	1,121	1,002
Trapp	8,645	7,686	6,469	6,081	5,461
Welch-Bornholdt	(3)	(3)	740	1,259	1,361
Other fields	55,068	58,334	60,414	[4] 63,074	[4] [5] 70,951
Total Kansas	107,220	114,118	114,845	[4] 114,566	[4] [5] 119,317

[1] Revised.
[2] Silica included with Chase.
[3] Included with "Other fields."
[4] Bureau of Mines figures.
[5] Preliminary figure.

Kentucky.—Activity increased in the western part of the State, and oil production increased 2 million barrels. Muhlenberg and Christian Counties were the scene of the most significant discoveries.

Louisiana.—Drilling activity in the Louisiana Gulf Coast area was about 10 percent higher in 1954 than in 1953. There was a much larger increase in offshore exploration and drilling as the result of the partial resolution of the conflicting Federal and State claims to these reserves. Thirty-four new fields were discovered in 1954, of which 8 were considered important. Four of the 8 were offshore.

In Northern Louisiana well completions increased 53 percent because of an accelerated drilling program for Annona chalk production in the Caddo-Pine Island field of Caddo Parish. Active drilling along the Wilcox, the Smackover, and the Cotton Valley areas was expected to continue because of the success achieved in 1954.

TABLE 17.—Production of crude petroleum in Louisiana, 1950–54, by districts and fields

(Thousand barrels)

District and field	1950	1951	1952	1953	1954[1]
Gulf Coast:					
Anse la Butte	2,194	2,442	2,373	2,165	1,691
Avery Island	2,649	3,018	3,090	3,111	2,721
Barataria	3,450	3,294	2,876	2,351	1,636
Bay de Chene	815	1,259	1,288	1,302	1,208
Bay Marchand	1,986	2,428	2,004	1,560	2,418
Bay St. Elaine	2,230	2,672	2,733	3,194	3,130
Bayou Blue	1,071	1,122	1,156	1,158	1,045
Bayou Mallett	874	1,253	1,604	1,796	1,456
Bayou Sale	4,737	5,139	5,199	4,710	3,589
Bully Camp	339	867	1,250	1,640	1,353
Caillou Island	5,335	6,499	7,136	8,540	8,398
Charenton	1,361	1,136	1,176	1,278	1,218
Cox Bay	29	1,123	2,102	2,700	3,412
Delta Farms	7,648	7,190	6,751	6,480	5,458
Dog Lake	901	1,320	1,276	1,530	1,269
Duck Lake	414	1,123	2,269	2,935	2,842
East White Lake	1,321	1,443	1,427	1,479	1,179
Egan	2,136	2,083	2,041	2,017	2,094
Erath	1,214	1,178	1,179	1,370	1,152
Garden Island	1,614	1,583	1,590	1,590	1,419
Gibson	1,539	1,460	1,498	1,410	1,135
Golden Meadows	5,020	4,864	4,546	3,918	3,970
Good Hope	2,240	2,434	2,288	2,045	1,434
Grand Bay	3,766	3,853	3,638	3,768	3,499
Gueydan	2,217	2,325	1,970	1,570	1,221
Hackberry	3,519	3,621	3,780	4,512	4,210
Horseshoe Bayou	1,246	1,346	1,303	1,394	1,101
Iowa	1,947	2,282	2,513	2,842	2,711
Jeanerette	947	1,067	1,084	1,137	1,228
Lafitte	4,332	4,489	4,467	4,650	3,688
Lake Chicot	1,031	1,105	1,104	1,072	1,024
Lake Pelto	1,625	2,173	2,456	2,697	2,324
Lake Salvador	1,972	2,086	1,843	1,831	1,417
Lake Washington	157	352	380	951	1,947
Leeville	2,112	2,205	2,417	3,251	3,551
Main Pass	1,331	2,057	2,445	4,287	4,912
New Iberia	1,462	1,470	1,275	1,241	1,012
North Crowley	1,767	1,659	1,390	1,504	1,273
Paradis	3,649	3,626	3,411	3,445	3,374
Phoenix Lake	148	614	1,507	1,781	1,778
Pine Prairie	1,168	1,048	984	955	859
Point-a-La Hache	1,603	2,484	2,746	2,689	2,451
Port Barre	1,470	1,438	1,285	1,327	1,056
Quarantine Bay	3,725	3,960	3,480	3,151	2,620
Romre Pass	606	2,315	3,641	4,570	4,711
St. Gabriel	1,577	1,793	2,095	1,778	1,274
Section 28	1,296	1,117	1,343	1,244	1,335
Sunshine	771	1,257	979	790	652
Tepetate	3,788	3,321	2,647	2,149	1,731
Timbalier Bay	57	368	1,731	2,514	2,289
University	2,840	2,203	1,811	1,534	1,395

See footnotes at end of table.

TABLE 17.—Production of crude petroleum in Louisiana, 1950–54, by districts and fields—Continued

(Thousand barrels)

District and field	1950	1951	1952	1953	1954 [1]
Gulf Coast—Continued					
Valentine	518	651	902	1,252	1,379
Venice	5,001	5,742	5,965	5,728	5,362
Ville Platte	1,888	1,462	1,424	1,335	1,402
Vinton	3,872	3,960	3,786	3,618	2,709
Weeks Island	5,183	8,199	10,680	11,258	9,036
West Bay	2,404	2,936	3,123	3,132	2,522
West Cote Blanche	1,704	2,392	2,830	2,865	2,380
West Lake Verrett	1,472	1,782	1,966	1,757	1,517
White Castle	1,692	1,672	1,563	1,343	943
Other Gulf Coast [2]	37,775	45,408	49,203	56,929	62,007
Total Gulf Coast	164,755	188,768	200,019	214,130	205,127
Northern:					
Big Creek	1,443	1,468	1,432	1,279	900
Caddo	5,689	4,995	5,111	5,438	8,251
Delhi	6,733	6,679	6,436	5,916	4,880
Haynesville	5,444	5,480	5,008	4,445	3,694
Lake St. John	6,695	5,871	4,870	4,015	3,162
Nebo [3]	2,328	2,302	2,272	2,268	2,270
Olla [4]	2,490	2,294	2,203	2,106	1,916
Rodessa	1,186	1,043	934	868	780
Other Northern [2]	12,202	13,381	15,644	16,167	15,144
Total Northern	44,210	43,513	43,910	42,502	40,997
Total Louisiana	208,965	232,281	243,929	256,632	246,124

[1] Preliminary figures.
[2] Includes crude oil consumed on leases and net change in stocks held on leases for entire district.
[3] Includes Hemphill, Trout Creek, and Jena.
[4] Includes Little Creek and Summerville.

TABLE 18.—Production of crude petroleum in Michigan, 1950–54, by fields, in thousand barrels

[Michigan Department of Conservation]

Field	1950	1951	1952	1953	1954 [1]
Beaver Creek	794	641	510	421	342
Coldwater	1,635	1,488	1,388	1,253	1,160
Deep River	2,080	2,029	1,847	1,774	1,569
East Norwich	331	384	470	488	462
Kawkawlin	722	631	559	480	447
Kimball Lake	847	569	411	288	194
Pentwater	1,410	718	660	383	274
Reed City and East Reed City	752	686	594	495	482
Rose City	(2)	180	557	599	553
St. Helen	354	388	410	307	238
Stony Lake	998	881	733	659	561
Other fields	5,903	5,332	5,112	5,138	5,745
Total Michigan	15,826	13,927	13,251	12,285	12,027

[1] Preliminary figures.
[2] Included with "Other fields."

Mississippi.—Drilling increased in Mississippi, but the number of new fields discovered was less than in 1953. Probably the most important discovery was the Bolton field in Hinds County. This was the first oil find in beds of the Paluxy formation of Lower Cretaceous age.

TABLE 19.—Production of crude petroleum in Mississippi, 1950–54, by fields

(Thousand barrels)

Field	1950	1951	1952	1953	1954 [1]
Baxterville	4, 951	6, 487	6, 212	5, 940	5, 137
Brookhaven	4, 714	4, 237	3, 905	4, 211	3, 724
Cranfield	4, 475	3, 334	2, 792	2, 398	1, 776
Eucutta	1, 994	1, 746	1, 670	1, 542	1, 352
Heidelburg	3, 457	3, 452	3, 437	3, 336	3, 098
LaGrange	4, 370	3, 666	3, 277	2, 701	2, 269
Mallalieu	3, 535	2, 520	1, 944	1, 484	1, 252
Tinsley	5, 190	5, 071	4, 934	4, 545	4, 326
Yellow Creek	1, 528	1, 650	1, 633	1, 652	1, 526
Other fields	4, 022	4, 876	6, 506	7, 811	9, 131
Total Mississippi	38, 236	37, 039	36, 310	35, 620	33, 591

[1] Preliminary figures.

TABLE 20.—Production of crude petroleum in Montana, 1950–54, by fields, in thousand barrels

[Montana Oil Conservation Board]

Field	1950	1951	1952	1953	1954 [1]
Big Wall	460	716	316	191	258
Bowes	61	427	1, 025	1, 095	980
Cat Creek	398	325	271	209	200
Cut Bank	2, 931	2, 724	2, 633	2, 673	2, 575
Elk Basin	1, 569	1, 821	1, 819	1, 704	1, 643
Glendive	(2)	(2)	(2)	601	718
Kevin-Sunburst	1, 486	1, 449	1, 344	1, 296	1, 207
Pondera	544	792	697	753	549
Poplar	(2)	(2)	(2)	1, 155	3, 016
Reagan	182	215	227	269	234
Sumatra	(2)	(2)	(2)	380	733
Other fields [3]	478	489	1, 274	1, 594	1, 574
Total Montana	8, 109	8, 958	9, 606	11, 920	13, 687

[1] Preliminary figures.
[2] Included in "Other fields."
[3] Includes crude oil consumed on leases and net change in stocks held on leases for entire State.

Montana.—The 19 discoveries in Montana were statewide, with 7 in the Williston Basin, 7 in the central and northern parts of the State, and 5 in southern Montana. Two of these discoveries were significant. A discovery along the eastern flank of the Cedar Creek anticline focused attention on the untested northern region of the Northern Powder River Basin.

Rapid development of the East Poplar field discovered in 1952 made this the largest producer in the State.

Nevada.—The first discovery of commercial quantities of oil in Nevada was made in 1954, when the Eagle Springs field was discovered in Railroad Valley, Nye County. Production was obtained at 6,700 feet from Tertiary rhyolitic tuffs.

New Mexico.—The discovery of oil in the Queen sand in the South Drickey field of southeastern Chaves County and at two locations farther northeast indicated that the shallow Queen sand would be productive for several square miles.

TABLE 21.—Production of crude petroleum in New Mexico, 1950–54, by districts and fields, in thousand barrels

[Oil and Gas Journal]

District and field	1950	1951	1952	1953	1954
Southeast:					
Bagley	(1)	1,662	2,447	2,033	1,867
Brunson	2,143	2,515	3,511	3,007	2,264
Caprock-East	(1)	(1)	(1)	1,886	2,135
Denton	(1)	873	4,329	8,668	10,651
Dollarhide-West	(1)	(1)	753	1,978	3,251
Drinkard	5,538	5,037	4,007	3,454	2,828
Eunice	3,898	[2] 10,590	[2] 9,588	[2] 9,321	[2] 9,029
Gladiola	(1)	(1)	780	1,304	1,571
Grayburg-Jackson	1,750	1,545	1,353	1,162	1,114
Hare	889	1,277	2,027	2,047	1,642
Hobbs	3,924	4,380	3,902	3,663	3,340
Langlis-Mattix	1,546	1,700	1,635	1,669	1,402
Lovington-East	(1)	(1)	1,136	2,472	3,250
Maljamar	2,011	1,829	1,818	1,792	1,790
Monument	6,168	(2)	(2)	(2)	(2)
Moore	(1)	(1)	(1)	(1)	1,166
Saunders-South	(1)	(1)	1,571	2,164	2,200
Vacuum	4,546	4,865	4,496	4,281	3,832
Warren	(1)	(1)	(1)	1,438	1,469
Other	14,571	16,129	14,811	[3] 17,326	[3] [4] 19,607
Northwest [3]	331	327	566	776	792
Total New Mexico	47,315	52,729	58,725	[3] 70,441	[3] [4] 75,200

[1] Included in "Other."
[2] Monument included with Eunice.
[3] Bureau of Mines figures.
[4] Preliminary figure.

North Dakota.—Exploratory drilling increased in North Dakota, but the success ratio dropped from 26 percent in 1953 to 7 percent in 1954. Discoveries were mainly in the deeper part of the Williston Basin along the Nesson anticline. The Beaver Lodge and Tioga fields had been almost completely developed. Completion of a natural-gasoline plant and 3 refineries provided outlets for North Dakota production, which was over 30,000 barrels per day at the end of the year.

Ohio.—The use of hydraulic fracturing in Clinton sand wells was successful in increasing oil production.

Texas.—*West Texas.*—A trend line of pre-Permian folding was established extending from the Pegasus field on the Upton-Midland County line, northwest into northeast Ector County. Considerable drilling in this area was expected in 1955.

Panhandle.—Drilling activity in the Texas Panhandle rose to heights comparable to the boom period of 1926–29. In all, 946 wells were drilled in 1954 compared with 699 in 1953. The exploratory trend throughout the area was toward deeper productive zones. The area in northeast Hansford County was most prolific in deeper pool discoveries.

West Central.—Oil production was increased in this region by extensive development drilling and the use of sand-fracturing methods on old producing fields. The trend of Cambrian production indicated in 1953 along the eastern side of Nolan County was explored

TABLE 22.—Production of crude petroleum in Oklahoma, 1950–54, by fields, in thousand barrels

[Oil and Gas Journal]

Field	1950	1951	1952	1953	1954
Allen	1,359	1,447	1,336	1,456	1,709
Bebee	1,272	1,073	1,244	1,087	926
Burbank	2,124	2,318	3,157	3,476	3,466
Cache Creek	1,511	1,289	1,042	956	787
Camp	(1)	(1)	975	1,606	1,329
Cement	4,091	4,127	3,964	4,070	3,517
Cumberland	3,628	3,475	3,102	2,562	1,690
Cushing	2,759	2,816	2,889	3,385	3,176
Dilworth	(1)	(1)	(1)	(1)	1,279
Doyle	(1)	(1)	2,475	3,934	2,976
Elk City	5,066	7,426	7,248	6,380	5,348
Eola	595	891	1,178	1,651	1,424
Fox-Graham	923	3.196	5,532	5,920	4,559
Glenn	2,551	2,502	2,252	2,145	2,045
Healdton	2,382	2,267	2,183	2,288	2,171
Hewitt	4,320	3,694	3,173	2,703	[2] 3,339
Holdenville-East	(1)	(1)	(1)	(1)	[3] 1,149
Hoover-Northwest	1,034	887	693	601	[4] 1,189
Knox	1,886	1,725	1,627	1,595	1,165
Milroy	(1)	(1)	1,091	2,325	1,755
Oklahoma City	6,785	6,303	5,513	5,187	4,148
Olympic	646	1,485	2,013	4,064	4,083
Payson-East	(1)	(1)	(1)	1,725	1,076
Ringwood	1,927	2,288	1,338	855	727
Seminole districts:					
Bowlegs	1,201	1,178	1,003	1,121	872
Little River	1,016	945	852	826	756
St. Louis	1,405	1,560	1,440	1,507	1.464
Seminole	1,164	1,207	1,077	1,211	998
Sholem Alechem	8,545	10,557	12,239	12.736	10,261
South Burbank	860	776	617	894	[5] 1,429
Tatums	3,456	3,378	3,466	3,892	3,321
Velma-West	10.227	16,089	[6] 18,999	[6] 16,064	8,435
West Edmond	3,914	3,482	4,471	1,887	[7] 1,821
Witcher	1.942	1,655	1,120	660	[8] 541
Yale-Quay	825	1,352	1,891	2,171	1,915
Other fields	84,429	95,478	[6] 90,323	[9] 99,630	[9] [10] 99,503
Total Oklahoma	163,843	186,866	191,523	[9] 202,570	[9] [10] 186,349

[1] Included with "Other fields."
[2] Includes Brock West and Lone Grove Southwest.
[3] Includes Grief Creek.
[4] Includes Hoover North, Brady Southwest, and Roady Northeast.
[5] Includes Fairfax, Coon Creek, and Arcadia Northeast.
[6] Revised.
[7] Includes Edmond Northwest and Lockridge Northeast.
[8] Includes Munger and Munger South.
[9] Bureau of Mines figures.
[10] Preliminary figure.

further. The E. A. Cambrian field was discovered in this trend, and a deeper pool test in the North Dora field in Nolan County found over 120 feet of net effective pay in the Cambrian sand.

South Texas.—The first recovery from the South Texas continental shelf was made in 1954. The discovery well was off Kleberg County and produced from the Frio formation.

Texas Gulf.—The first sale of Federal leases off the Texas coast was held in 1954 and brought an average bonus of $562 per acre for the 30,240 acres on which bids were received.

Utah.—The first commercial oil production from the Paradox formation was discovered at Desert Creek in the Paradox Basin in southeastern San Juan County. Exploration in the Unita Basin continued as in 1953.

TABLE 23.—Production of crude petroleum in Texas, 1950–54, by districts

(Thousand barrels)

District and field [1]	1950	1951	1952	1953	1954 [2]
Gulf Coast:					
Amelia	715	1,073	1,004	1,282	1,161
Anahuac	6,801	7,727	7,032	6,453	5,240
Barbers Hill	2,110	2,038	2,132	1,862	1,805
Beaumont, West	499	662	986	1,148	1,035
Bloomington	1,775	1,934	1,756	1,535	1,341
Boling	1,019	1,110	1,524	1,959	1,763
Chocolate Bayou	4,272	5,166	5,028	4,531	4,952
Conroe	11,943	14,081	12,813	11,937	10,081
Damon Mound	89	147	369	605	1,153
Dickinson-Gillock	3,493	4,090	4,105	4,235	4,030
Dyersdale	1,550	1,449	1,340	1,183	975
Esperson	1,508	1,496	1,474	1,365	1,284
Fairbanks	1,696	1,403	1,383	1,585	1,426
Falls City	1,101	1,341	1,232	1,059	898
Fannette	1,425	1,737	1,780	1,760	1,600
Francitas	148	280	656	962	1,172
Friendswood	11,386	14,989	13,729	12,398	10,378
Gohkle, Helen	(3)	955	2,180	2,512	2,478
Goose Creek	2,451	2,873	3,148	2,692	2,715
Greta	2,858	3,512	3,269	2,871	2,370
Hankamer	523	835	1,136	1,072	1,110
Hastings	13,247	16,536	14,767	13,644	11,570
Heyser	1,288	1,671	1,491	1,361	1,064
High Island	2,380	2,384	2,291	2,605	2,819
Houston, South	1,193	1,192	1,255	1,286	1,377
Hull	3,534	4,612	[4] 3,388	2,660	4,411
Humble	1,257	1,246	1,036	958	1,067
Liberty, South	2,064	1,665	1,626	2,011	2,348
Livingston	1,373	1,395	1,208	1,154	1,086
Lolita	1,502	1,803	1,589	1,476	1,247
Lovell's Lake	1,220	1,418	1,217	978	863
McFaddin	1,126	1,339	1,368	1,275	1,076
Manvel	2,011	2,393	2,166	2,058	1,735
Markham	1,139	1,333	1,585	1,691	1,548
Old Ocean	5,521	6,247	6,268	5,954	4,994
Oyster Bayou	2,418	3,519	3,368	3,219	3,104
Pierce Junction	1,444	1,782	1,591	1,349	1,036
Placedo	1,944	2,291	1,997	2,210	1,951
Port Neches	718	1,621	1,847	1,846	1,687
Raccoon Bend	1,657	1,874	1,966	2,225	2,068
Refugio-Fox	2,442	2,708	2,655	2,419	2,490
Saratoga	701	673	758	675	1,417
Silsbee	1,223	1,364	1,465	1,398	1,248
Sour Lake	1,883	2,009	1,804	1,576	1,451
Stowell	2,288	2,336	2,360	1,936	1,645
Sugarland	1,059	1,380	1,294	1,193	933
Sugar Valley	2,056	1,943	1,468	1,364	1,143
Thompson	10,187	12,840	11,846	10,563	9,099
Tomball	2,212	2,444	2,204	2,095	1,888
Village Mills	2,291	3,300	3,216	3,494	2,871
West Columbia	2,619	2,331	2,297	2,252	2,344
West Ranch	5,456	7,525	6,844	6,652	5,427
Withers-Magnet	3,718	4,345	4,018	3,933	3,467
Other Gulf Coast [5]	56,730	68,990	69,268	73,120	70,433
Total Gulf Coast	199,263	239,407	231,597	227,636	211,874
East Texas:					
East Texas proper	97,825	100,695	96,526	90,743	81,824
Cayuga	1,808	1,568	1,373	1,258	1,112
Ham Gossett	(3)	465	1,040	1,186	1,239
Hawkins	10,439	13,638	16,261	18,417	16,613
Long Lake	1,415	1,619	1,476	1,236	959
New Hope	1,836	2,355	2,309	2,191	2,481
Pewitt Ranch	434	1,874	1,637	1,444	1,209
Pickton	754	2,027	1,383	1,788	1,657
Quitman	2,740	3,078	2,848	2,941	2,230
Talco	5,891	6,692	6,440	5,876	4,928
Van	7,358	9,698	11,349	10,650	8,850
Waskom	444	896	1,131	1,398	1,049
Other East Texas	13,247	17,641	15,664	13,770	17,781
Total East Texas	144,191	162,246	159,437	152,898	141,932

See footnotes at end of table.

TABLE 23.—Production of crude petroleum in Texas, 1950–54, by districts—Con.

District and field [1]	1950	1951	1952	1953	1954 [2]
Central Texas:					
Big Foot	154	456	793	1,792	2,413
Charlotte	2,223	2,434	1,778	1,536	1,760
Darst Creek	2,534	2,830	2,943	3,210	3,466
Luling	1,608	1,951	2,385	2,410	2,433
Other Central Texas	3,250	3,846	4,148	4,733	5,086
Total Central Texas	9,769	11,517	12,047	13,681	15,158
North Texas [6] [7]	79,998	87,985	96,513	111,269	115,979
Panhandle [8]	33,131	31,287	29,272	28,080	30,903
South Texas:					
Aqua Dulce	2,094	2,232	1,945	1,736	1,500
Flour Bluff	916	1,016	1,066	1,200	1,286
Fulton	1,202	1,819	1,945	2,718	2,985
Garcia	1,064	1,321	1,294	1,223	1,057
Hoffman	1,069	2,154	1,983	1,841	1,500
Kelsey	2,284	3,017	3,059	3,243	3,173
London Gin	974	1,330	1,192	1,106	955
Mustang Island	(3)	1,332	2,154	2,878	2,697
Saxet-Saxet Frio	1,499	1,176	980	998	1,080
Stratton	3,150	3,680	3,344	2,990	2,403
Sun	1,260	1,293	1,405	1,618	1,752
Taft	1,096	1,491	1,477	1,491	1,580
White Point	2,674	3,391	3,312	3,319	2,973
Willamar and West	2,092	2,205	3,152	2,920	2,434
Other South Texas	55,452	69,092	66,665	65,377	60,744
Total South Texas	76,826	96,549	94,973	94,658	88,119
West Texas:					
Andrews	31,860	37,308	38,225	39,305	43,969
Borden	2,978	8,981	9,614	8,888	5,728
Coke	3,852	4,790	5,817	9,397	13,553
Crane-Upton	22,973	31,557	42,500	39,282	37,260
Crockett	7,078	8,574	8,725	8,532	8,447
Dawson	1,534	2,305	2,300	2,469	2,664
Ector [9]	57,096	69,576	69,516	55,779	51,484
Gaines-Yoakum	28,703	35,742	34,854	36,941	36,122
Garza	3,364	4,199	3.802	3,787	4,230
Glasscock-Howard-Mitchell	8,977	11,598	9,597	16,841	20,114
Hockley [10]	27,597	31,338	30,263	26,832	22,804
Kent	3,525	7,121	6,980	7,638	6,568
King	863	1,090	978	806	676
Midland	873	9,598	14,885	10,054	12,787
Pecos	17,862	22,305	22,004	20,358	17,672
Reagan	2,372	2,031	3,007	6,629	11,024
Reeves	1,090	1,295	1,609	1,299	728
Runnels	1,063	7,703	6,052	10,205	6,185
Scurry	36,529	48,478	48,077	43,421	36,050
Schleicher	350	863	2,465	3,179	3,298
Terry	1,172	3,391	5,102	6,647	6,106
Tom Green	1,152	1,911	1,618	1,173	1,369
Ward	5,380	8,281	11,521	10,221	9,548
Winkler	17,961	19,228	16,653	16,111	14,928
Other West Texas	492	2,016	2,136	5,148	4,443
Total West Texas	286,696	381,279	398,300	390,942	377,757
Total Texas	829,874	1,010,270	1,022,139	1,019,164	981,722

[1] Texas Railroad Commission districts.

[2] Preliminary figures.

[3] Included in "Other."

[4] A new field was created out of a portion of Hull and included in "Other Gulf Coast."

[5] Includes crude oil consumed on leases for entire district.

[6] Includes the fields in and between Hardeman, Wilbarger, Wichita, Clay, Montague, and Cook Counties on the north and San Saba, Lampasas, and Coryell on the south.

[7] Includes crude oil consumed on leases and net change in stocks held on leases for East (exclusive of East Texas proper) Central, North, and South Texas.

[8] Carson, Gray, Hutchinson, Moore, Sherman, and Wheeler Counties.

[9] Includes the part of Jordan pool in Crane County.

[10] Includes Slaughter and Levelland fields.

TABLE 24.—Production of crude petroleum in Wyoming, 1950–54, by fields

(Thousand barrels)

Field	1950	1951	1952	1953	1954 [1]
Big Sand Draw	2,077	2,185	2,387	2,400	2,503
Big Muddy	674	878	1,197	1,373	1,088
Bonanza	----------	([2])	1,620	2,935	3,536
Byron-Garland	4,849	5,186	4,343	5,603	6,642
Cole Creek, Northeast and South	837	1,317	1,820	2,271	1,506
Elk Basin	5,583	7,292	8,041	8,488	6,889
Fiddler Creek	3,696	2,126	1,321	865	512
Frannie	2,968	3,703	3,709	3,731	3,708
Glenrock and South	381	1,597	2,414	4,197	3,940
Grass Creek	1,317	1,816	2,395	3,583	4,367
Hamilton Dome	3,531	3,870	3,075	3.558	3,766
Lance Creek	2,669	2.385	1,895	1,662	1,937
Little Buffalo	1,285	1,001	951	1,142	1,224
Lost Soldier, Wertz, etc	5,362	5,225	5,299	5,900	6,519
Mush Creek	934	747	773	878	640
Oregon Basin	2,839	3,717	2,688	3,508	4,898
Salt Creek	4,165	4,063	4,159	4,375	4,583
Steamboat Butte	2,410	3,018	2,056	3,611	3,443
Sussex-Meadow Creek	2,010	3,043	2,960	4,022	6,802
Winkleman	828	817	811	1,255	1,414
Worland	2,173	1,643	1,421	1,105	937
Other fields [3]	11,043	13,300	12,739	16,156	22,779
Total Wyoming	61,631	68,929	68,074	82,618	93,633

[1] Preliminary figures.
[2] Included in "Other fields."
[3] Includes crude oil consumed on leases and net change in stocks held on leases for entire State.

Wyoming.—Exploratory drilling increased only slightly, but new field wildcats were 30 percent greater than in 1953. New field discoveries in widely separated parts of the State should have encouraged exploratory drilling over a larger area. The Grieve field discovered in the southeastern part of the Wind River Basin in Natrona County was in a previously unimportant producing area. The Curtis sand may become a more favorable drilling objective in the Wind River and Big Horn Basins as a result of production obtained in the Northwest Sheldon field in Fremont County.

WELLS

The number of wells drilled in the United States, including oil and gas wells completed and dry holes, set a new record of 52,919 in 1954, an increase of 4,902 wells over 1953. The percentage of dry holes decreased from 38.4 percent of all wells drilled in 1953 to 36.2 percent in 1954. The States reporting the largest gains in the total number of wells drilled were Texas 1,895, Oklahoma 998, Illinois 969, Louisiana 797, and Colorado 624.

The total number of producing oil wells in the United States rose from 498,940 on December 31, 1953, to 511,200 on December 31, 1954, while the daily average production per well declined from 13.1 barrels in 1953 to 12.6 barrels in 1954.

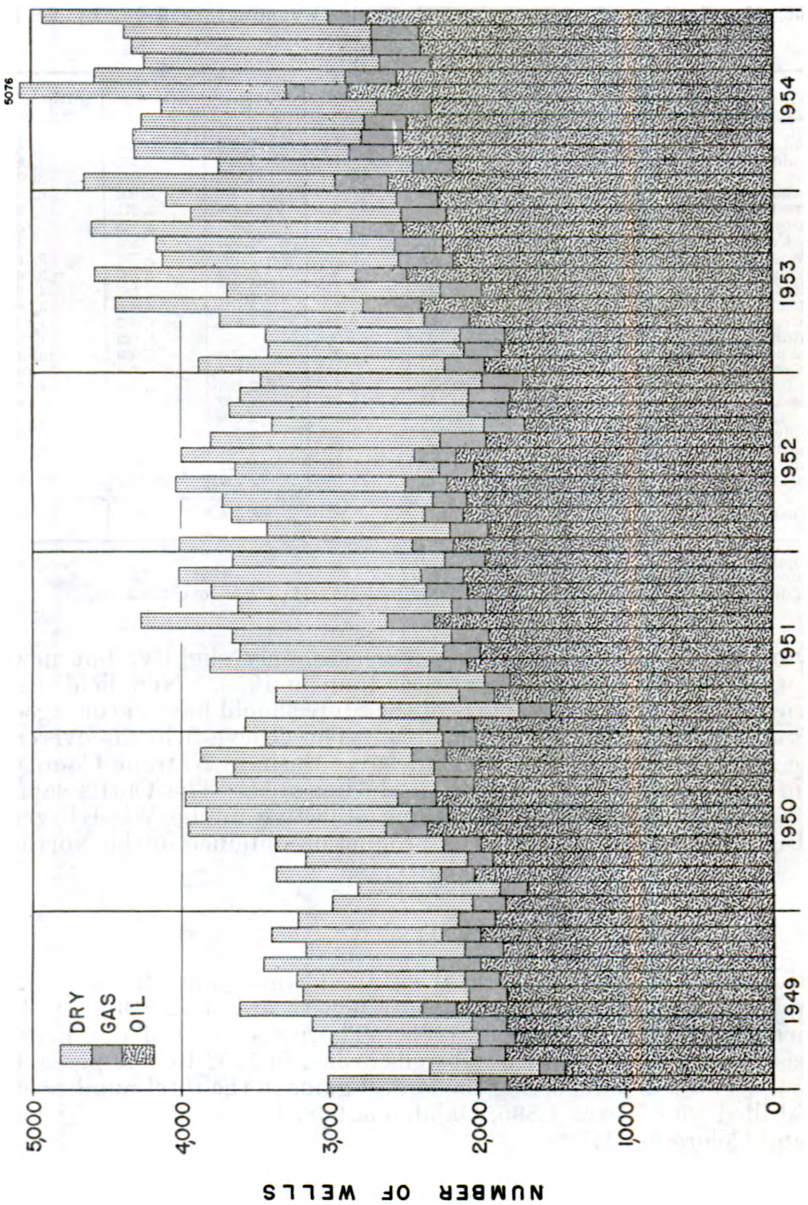

FIGURE 4.—Wells drilled in the United States, 1949–54, by months.

TABLE 25.—Wells drilled for oil and gas in the United States, 1953–54, by months

[Oil and Gas Journal]

Wells	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
													Number	Percent
1953														
Oil	1,943	1,831	1,807	2,046	2,378	1,966	2,471	2,156	2,228	2,489	2,194	2,253	25,762	53.7
Gas	275	253	310	309	391	275	349	374	324	355	309	282	3,806	7.9
Dry	1,649	1,313	1,305	1,386	1,671	1,444	1,761	1,582	1,606	1,754	1,423	1,555	18,449	38.4
Total	3,867	3,397	3,422	3,741	4,440	3,685	4,581	4,112	4,158	4,598	3,926	4,090	48,017	100.0
1954														
Oil	2,601	2,164	2,564	2,488	2,467	2,298	2,867	2,534	2,298	2,370	2,379	2,743	29,773	56.3
Gas	348	268	300	286	289	359	413	352	348	331	328	355	3,977	7.5
Dry	1,705	1,317	1,443	1,537	1,499	1,468	1,796	1,696	1,593	1,628	1,665	1,822	19,169	36.2
Total	4,654	3,749	4,307	4,311	4,255	4,125	5,076	4,582	4,239	4,329	4,372	4,920	52,919	100.0

TABLE 26.—Wells drilled for oil and gas in the United States, 1953–54, by States, and districts

[Oil and Gas Journal]

State and district	1953				1954			
	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
Alabama	17	--------	86	103	2	2	59	63
Arkansas	273	1	298	572	366	10	289	665
California	1,869	48	649	2,566	1,668	47	620	2,335
Colorado	258	63	413	734	486	72	800	1,358
Illinois	1,070	4	1,091	2,165	1,709	4	1,421	3,134
Indiana	452	22	803	1,277	310	12	565	887
Kansas	2,209	380	2,126	4,715	2,428	381	1,864	4,673
Kentucky	398	194	571	1,163	487	214	485	1,186
Louisiana:								
Gulf Coast	877	103	552	1,532	942	122	537	1,601
Northern	722	119	441	1,282	1,431	166	413	2,010
Total Louisiana	1,599	222	993	2,814	2,373	288	950	3,611
Michigan	244	19	357	620	219	10	334	563
Mississippi	134	12	251	397	164	8	269	441
Montana	221	22	208	451	156	17	170	343
Nebraska, Missouri	127	12	191	330	232	20	259	511
New Mexico	575	600	243	1,418	548	392	186	1,126
Oklahoma	4,596	339	2,525	7,460	5,417	383	2,658	8,458
Pennsylvania, New York, Ohio, West Virginia	1,523	850	556	2,929	1,121	1,163	694	2,978
Texas:								
Gulf Coast	1,133	291	1,094	2,518	1,368	197	1,087	2,652
West Texas	2,664	30	1,026	3,720	3,329	65	1,034	4,428
East Texas	300	99	408	807	419	169	465	1,053
Other districts	5,283	558	4,062	9,903	5,952	481	4,277	10,710
Total Texas	9,380	978	6,590	16,948	11,068	912	6,863	18,843
Wyoming	622	25	270	917	818	29	374	1,221
Other States	195	15	228	438	201	13	309	523
Total United States	25,762	3,806	18,449	48,017	29,773	3,977	19,169	52,919

TABLE 27.—Producing oil wells in the United States and average production per day, 1953–54, by States and districts

State and district	1953		1954 [1]	
	Approximate number, Dec. 31	Average production per well per day (barrels)	Approximate number, Dec. 31	Average production per well per day (barrels)
Arkansas	4,190	20.0	4,410	18.6
California	31,920	31.8	32,860	30.1
Colorado	1,220	89.8	1,750	75.7
Illinois	29,520	5.7	30,280	6.1
Indiana	4,020	8.9	4,160	7.5
Kansas	35,420	9.1	37,755	8.9
Kentucky	16,600	1.9	16,900	2.3
Louisiana:				
Gulf Coast	6,680	93.6	7,330	80.2
Northern	7,540	15.6	8,650	13.9
Total Louisiana	14,220	51.1	15,980	44.6
Michigan	4,000	8.4	4,173	8.1
Mississippi	1,950	51.1	2,173	44.6
Montana	3,410	9.4	3,415	11.0
Nebraska	350	53.5	550	45.2
New Mexico	7,320	27.4	7,760	27.3
New York	22,730	.5	22,390	.4
North Dakota	257	83.5	460	45.7
Ohio	15,670	.6	14,110	.7
Oklahoma	63,400	9.0	65,390	7.9
Pennsylvania	79,430	.4	73,700	.3
Texas: [2]				
Gulf Coast	20,080	31.7	19,600	29.3
West Texas	40,390	27.4	45,080	24.2
East Texas proper	21,540	11.5	20,670	10.6
Other districts	61,980	13.8	67,840	13.1
Total Texas	143,990	19.7	153,190	18.1
West Virginia	13,460	.6	12,900	.6
Wyoming	5,530	40.0	6,530	42.5
Other States [3]	333	35.7	364	32.8
Total United States	498,940	13.1	511,200	12.6

[1] Preliminary figures.
[2] Texas Railroad Commission divisions.
[3] Alabama, Florida, Missouri, Nevada, South Dakota, Tennessee, Utah, and Virginia.

CONSUMPTION AND DISTRIBUTION

The total annual demand for crude oil in the United States declined in 1954 for the first time since 1949. The 0.7-percent decrease included a 2.4-percent gain in the demand for foreign crude and a 1.1-percent decline in the demand for domestic crude. Foreign crude supplied 9.3 percent of the total.

The decline in the total demand for crude oil in 1954 amounted to 19.2 million barrels, including a decline of 15.3 million in total crude runs, a drop of 6.4 million in exports, and a gain of 2.5 million barrels in crude used as fuel (transfers) and losses. The major demand for crude oil is for conversion to products at refineries (runs to stills)—98.7 percent of the total in 1954 compared with 98.6 percent in 1953. The small decline in crude demand was due primarily to comparison with an inflated demand in 1953 caused by an abnormal increase in stocks of refined products.

Runs to Stills.—Total crude runs to stills declined from 7,000,000 barrels daily in 1953 to 6,958,000 in 1954, a decrease of 0.6 percent. The relative importance of the refinery districts in 1954 was indicated by the percentage of total crude runs as follows: Texas Gulf 24.3 percent, Indiana-Illinois 18.3 percent, East Coast 14.8 percent, California 14.7 percent, Oklahoma-Kansas 8.6 percent, Louisiana Gulf 8.2 percent, Rocky Mountain 3.7 percent, Texas Inland 3.4 percent, Appalachian 2.7 percent, and Arkansas-Louisiana Inland 1.3 percent. The only gains in crude runs in 1954 were in the Louisiana Gulf, Oklahoma-Kansas, Rocky Mountain, and Arkansas-Louisiana Inland districts.

Distribution.—The Bureau of Mines collects data relating to receipts of domestic and foreign crude petroleum at refineries in the United States. These receipts include the crude runs to stills, a small amount used as refinery fuel, and any increase in crude stocks at refineries. Classification of receipts, by States of origin, indicates the amount received from local production (intrastate), from other States (interstate), and receipts of imported crude. Classification by method of transportation indicates the final receipts by boat, pipeline, tank cars, and trucks. Receipts of domestic crude by boat were, in most instances, moved by pipeline from point of production to point of shipment by boat.

Receipts of domestic and foreign crude petroleum at refineries totaled 2,536.6 million barrels in 1954 and, supplemented by 5.4 million barrels from crude stocks held at refineries, provided for total crude runs of 2,539.6 million barrels and 2.4 million for fuel use or losses. Receipts of foreign crude represented 9.4 percent of the total, interstate receipts of domestic crude 37.0 percent, and intrastate receipts 53.6 percent (table 31).

Refinery receipts of crude oil in 1954, by methods of transportation, indicated that 74.8 percent was delivered by pipeline, 23.8 percent by boat, and 1.4 percent by tank cars and trucks. The initial movement of domestic crude oil is primarily by pipeline, with a considerable subsequent movement by boat. Tank-car and truck movements are largely local.

Receipts of crude oil by boat were 604 million barrels in 1954, which included 237 million of foreign crude, 206 million of interstate domestic crude, and 161 million of intrastate traffic. Of the total imports of foreign crude oil (including less than 3 million barrels delivered by pipeline), about 89 percent was received in the East Coast district, 8 percent in the California district, 2 percent in the Gulf Coast district, and 1 percent in Indiana-Illinois district. The major interstate boat movements of crude oil were 160 million barrels from the Gulf coast to the east coast, about 35 million barrels of interchanges between Texas and Louisiana, and 8 million barrels of river movement to Kentucky refineries. The most important intrastate receipts by boat were 67 million barrels in California, 49 million in Louisiana and Mississippi, 35 million in Texas, and 10 million in Kentucky.

TABLE 28.—Runs to stills of crude petroleum in the United States in 1954, by districts and months

(Thousand barrels)

District[2]	January	February	March	April	May	June	July	August	September	October	November	December	Total
East Coast:													
Domestic	14,799	13,595	14,157	14,131	13,704	12,953	12,893	13,764	12,801	13,504	12,804	13,304	162,409
Foreign	17,536	14,883	17,490	15,763	18,468	17,973	20,363	19,061	18,171	17,678	16,865	19,185	213,436
Total East Coast	32,335	28,478	31,647	29,894	32,172	30,926	33,256	32,825	30,972	31,182	29,669	32,489	375,845
Appalachian	6,603	5,959	6,038	5,402	5,808	6,033	5,855	5,535	5,233	5,175	5,018	5,359	68,018
Indiana, Illinois, Kentucky, etc.:													
Domestic	40,351	37,217	39,309	37,164	40,120	37,979	39,792	37,915	36,326	37,678	37,922	41,442	463,215
Foreign	246	137	175	115	157	200	331	345	261	225	91	142	2,425
Total Indiana, Illinois, Kentucky, etc	40,597	37,354	39,484	37,279	40,277	38,179	40,123	38,260	36,587	37,903	38,013	41,584	465,640
Oklahoma, Kansas, etc	17,632	16,633	18,037	17,063	19,136	18,462	18,607	18,477	17,760	18,835	18,700	19,980	219,322
Texas Inland	7,480	7,032	7,569	7,481	7,530	7,279	7,179	7,044	7,079	7,180	6,711	7,410	86,974
Texas Gulf Coast:													
Domestic	50,896	47,407	52,327	50,523	51,762	48,859	48,976	51,122	51,518	52,388	52,172	55,347	613,387
Foreign	24	126	205	189	142	42	461	358	312	416	434	362	3,071
Total Texas Gulf Coast	50,920	47,623	52,532	50,712	51,904	48,901	49,437	51,480	51,830	52,804	52,606	55,709	616,458
Louisiana Gulf Coast:													
Domestic	17,052	16,156	17,207	16,304	17,370	16,810	17,403	17,750	16,873	17,918	18,030	18,738	207,611
Foreign	37	128	125	120	198	148	123	108	168	124	47	49	1,375
Total Louisiana Gulf Coast	17,089	16,284	17,332	16,424	17,568	16,958	17,526	17,858	17,041	18,042	18,077	18,787	208,986
Arkansas, Louisiana Inland, etc	2,646	2,426	2,787	2,486	2,735	2,670	2,781	2,683	2,618	2,827	2,650	2,736	32,045
Rocky Mountain	7,682	7,391	7,831	6,850	8,206	8,270	8,391	8,284	8,093	7,081	7,410	8,313	93,802
California:													
Domestic	31,123	26,840	29,874	29,552	31,682	29,507	29,163	28,942	29,009	29,453	29,153	29,685	353,983
Foreign	1,259	1,894	1,489	1,193	1,160	1,223	2,084	1,320	1,933	1,369	1,237	2,330	18,491
Total California	32,382	28,734	31,363	30,745	32,842	30,730	31,247	30,262	30,942	30,822	30,390	32,015	372,474
Total United States: Domestic	196,264	180,746	195,136	186,956	198,053	188,822	191,040	191,516	187,310	192,039	190,570	202,314	2,300,766
Foreign	19,102	17,168	19,484	17,380	20,125	19,586	23,362	21,192	20,845	19,812	18,674	22,068	238,798
Grand total: 1954	215,366	197,914	214,620	204,336	218,178	208,408	214,402	212,708	208,155	211,851	209,244	224,382	2,539,564
1953	218,288	195,133	217,073	203,425	217,074	212,433	220,197	222,048	210,686	213,017	209,599	215,892	2,554,865
Daily average	6,947	7,068	6,923	6,811	7,038	6,947	6,916	6,862	6,939	6,834	6,975	7,238	6,958

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[1] Preliminary figures.

[2] Where no breakdown is shown, runs were all of domestic crude.

TABLE 29.—**Receipts of domestic and foreign crude petroleum at refineries in the United States 1950–54, by methods of transportation**

(Million barrels)

Method of transportation	1950	1951	1952	1953	1954 [1]
By boat:					
Intrastate	128.6	145.9	170.0	173.1	161.0
Interstate	221.2	256.9	243.1	231.1	205.6
Foreign	177.7	178.7	208.5	233.9	236.9
Total by boat	527.5	581.5	621.6	638.1	603.5
By pipeline:					
Intrastate	998.7	1,127.0	1,113.7	1,158.1	1,172.6
Interstate	542.6	629.4	680.3	727.7	721.2
Foreign		.4	1.1	2.5	2.6
Total by pipeline	1,541.3	1,756.8	1,795.1	1,888.3	1,896.4
By tank car and truck:					
Intrastate	16.2	18.3	20.6	26.1	26.2
Interstate	15.4	15.4	10.1	11.5	10.5
Total by tank car and truck	31.6	33.7	30.7	37.6	36.7
Grand total	2,100.4	2,372.0	2,447.4	2,564.0	2,536.6

[1] Preliminary figures.

Demand by State of Origin.—The detailed data on receipts of crude oil at refineries permit an analysis of the distribution of domestic crude oil by refining States and districts. Where long-distance shipments are involved and various crudes may be mixed in transit and storage, identification by origin may be only approximate.

The indicated total demand for domestic crude oil amounted to 2,333 million barrels in 1954, a decline of 1 percent compared with 1953. Eight States had a demand of over 50 million barrels each and supplied 92 percent of the total demand for domestic crude oil in 1954. There was no change in the relative rank of these States in 1954. When total demand drops, the States with the largest surplus and widest distribution tend to show greater decreases than the States with more local-market areas.

The demand for Texas crude oil dropped 3 percent in 1954, and that State supplied only 42.6 percent of the total demand for domestic crude oil, compared with 43.4 percent in 1953. Receipts of Texas crude oil at refineries were 997 million barrels in 1954. Intrastate receipts increased 3 million barrels, and interstate receipts declined 45 million, or from 43.8 percent of total receipts in 1953 to 41.2 percent in 1954. The decrease in outside markets included declines of 32 million barrels in the Illinois-Indiana district and 19 million barrels in the East Coast district, while receipts in the Oklahoma-Kansas district rose 7 million barrels. These changes were related to the increase in the imports of foreign crude in the east coast, to the large increase in crude production in Illinois, and to a sharp decline in crude production in Oklahoma.

California ranked second as a source of domestic crude oil and furnished 15.4 percent of the total domestic demand in both 1953 and 1954; the 1-percent decrease in demand was at the same rate as the national decline. California crude was consumed in the State, except for a small export of crude, primarily to western Canada.

TABLE 30.—Refinery receipts of domestic crude oil in 1954, by States and districts

(Thousand barrels)

Receiving State and district	Total domestic receipts	Intrastate receipts	Interstate receipts from—																		
			Ala. and Miss.	Ark.	Calif. and Nev.	Colo.	Fla. and N. Y.	Ill.	Ind.	Kans.	Ky. and Ohio	La.	Mont.	Nebr., N. Dak., and S. Dak.	N. Mex.	Okla.	Pa.	Tex.	W. Va.	Wyo.	Total
Florida, Georgia, South Carolina																					
Maryland	13,112		538									8,557						4,017			13,112
Massachusetts, Rhode Island	8,748		822				227					5,234						2,465			8,748
New Jersey	51,648		1,014				340					9,798			435		708	39,353			51,648
New York:																					
East	4,022		3,775															247			4,022
West	19,395	1,795						2,684		2,057					273	3,385	632	8,569			17,600
Pennsylvania:																					
East	84,106		285									11,840						71,981			84,106
West	14,848	9,225						237			720					2,064		1,733	869		5,623
West Virginia	3,316	1,571						371			384					990					1,745
District 1	199,195	12,591	6,434				567	3,292		2,057	1,104	35,429			708	6,439	1,340	128,365	869		186,604
Illinois	161,163	26,254				2,131			1,508	18,999		328	1,012	707	11,500	23,131		64,809		10,784	134,909
Indiana	137,485	1,017				780		4,569		20,031				1,553	360	22,857		58,952		27,366	136,468
Kansas	86,354	64,397				195								6		9,630		11,864		262	21,957
Kentucky, Tennessee	25,547	12,173	3,031	794				40	2,764		50	6,350						345			13,374
Michigan	42,419	13,559				1,014		5,674	149					270		3,750		11,225		6,778	28,860
Minnesota, Wisconsin	6,647					97		38					3,142	2,162						1,208	6,647
Missouri	23,383									1,802				1		3,113		16,923		1,544	23,383
Nebraska	789	234								4										551	555
North Dakota and South Dakota	2,776	2,773											3								3
Ohio:																					
East	30,278	2,485		90		420		18,058		3,047	3,215				672	1,384		907			27,793
West	90,269	84	38	727		2,706		12,366		1,108	698	1,784		1,237		17,152		51,869		500	90,185
Oklahoma	105,575	75,657								10,867					1,492			17,559			29,918
District 2	712,685	198,633	3,069	1,611		7,343		40,745	4,421	55,858	3,963	8,462	4,157	5,936	14,024	81,017		234,453		48,993	514,052

Alabama, Mississippi	5,236	4,258	933	------	------	------	------	------	------	------	------	------	------	------	------	------	------	45	------	------	978
Arkansas	24,091	21,186	------	------	------	------	------	------	------	------	------	358	------	------	------	------	------	2,547	------	------	2,905
Louisiana	210,869	134,928	19,633	12,142	------	------	------	------	------	------	------	------	------	------	------	------	------	44,166	------	------	75,941
New Mexico	6,905	5,725	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1,180	------	------	1,180
Texas	698,990	586,474	------	8	------	------	------	------	------	131	------	61,087	------	------	48,897	2,393	------	------	------	------	112,516
District 3	946,091	752,571	20,566	12,150	------	------	------	------	------	131	------	61,445	------	------	48,897	2,393	------	47,938	------	------	193,520
Colorado	8,773	2,308	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	6,465	6,465
Montana	19,747	8,275	------	------	------	------	------	------	------	------	------	------	------	3	------	------	------	------	------	11,469	11,472
Utah	26,283	1,821	------	------	24	23,309	------	------	------	------	------	------	------	------	11	------	------	------	------	1,118	24,462
Wyoming	32,279	31,639	------	------	------	640	------	------	------	------	------	------	------	------	------	------	------	------	------	------	640
District 4	87,082	44,043	------	------	24	23,949	------	------	------	------	------	------	------	3	11	------	------	------	------	19,052	43,039
California, etc., district 5	352,029	352,029	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
United States total, 1954	2,297,082	1,359,867	30,069	13,761	24	31,292	567	44,037	4,421	58,046	5,067	105,336	4,157	5,939	63,640	89,849	1,340	410,756	869	68,045	937,215
Daily average, 1954	6,293	3,725	82	38	------	86	2	121	12	159	14	289	21	16	174	243	4	1,125	2	187	2,568
Daily average, 1953	6,377	3,719	85	27	------	76	2	110	9	139	10	320	9	25	156	275	6	1,249	1	159	2,658

TABLE 31.—Crude runs to stills and refinery receipts of crude oil in 1954, by method of transportation and by States and districts

(Thousand barrels)

Receiving State and district	Crude runs to stills	Fuel and losses	Change in refinery stocks	Total receipts, by method of transportation						
				Intrastate			Interstate			Foreign boats
				Pipelines	Tank cars and trucks	Boats	Pipelines	Tank cars and trucks	Boats	
Florida, Georgia, South Carolina	4,173	31	−32							4,172
Maryland	21,886	−15	−429						13,112	8,330
Massachusetts, Rhode Island	14,511	−1	−10						8,748	5,752
New Jersey	140,314	396	−1,035				1,143		50,505	88,027
New York:										
East	13,850	44	−131						4,022	9,741
West	19,518	−9	−114	1,795			17,600			
Pennsylvania:										
East	181,111	319	67						84,106	97,391
West	14,969	−3	−118	9,156	69		4,378	95	1,150	
West Virginia	3,310	−2	8	1,534	37		1,745			
District 1	413,642	760	−1,794	12,485	106		24,866	95	161,643	213,418
Illinois	161,355	53	−245	26,254			134,563	346		
Indiana	137,292	3	190	607	410		135,516	952		
Kansas	86,493	16	−155	63,260	1,137		21,897	60		
Kentucky, Tennessee	26,047		−500	2,095	134	9,944	5,085	785	7,504	
Michigan	41,846	637	−64	12,904	655		28,752	108		
Minnesota, Wisconsin	8,280	97	−74				97	5,568	982	[1] 1,656
Missouri	23,435	−3	−49				23,383			
Nebraska	817		−28	93	141		551	4		
North Dakota and South Dakota	2,551	5	220	2,616	157		3			
Ohio:										
East	30,221	−3	60	2,444	41		27,793			
West	90,820	10	555	76	8		90,185			1,116
Oklahoma	106,026	143	−594	74,955	702		29,918			
District 2	715,183	958	−684	185,304	3,385	9,944	497,743	7,823	8,486	2,772
Alabama, Mississippi	6,186	8	40	2,712	487	1,059		553	425	998
Arkansas	23,901	−4	194	20,997	189		2,756	149		
Louisiana	210,944	302	−8	86,057	1,155	47,716	67,662	964	7,315	369
New Mexico	6,889	25	−9	5,270	455		1,175	5		
Texas	703,432	63	−1,319	543,098	8,020	35,356	84,800	25	27,691	3,186
District 3	951,352	394	−1,102	658,134	10,306	84,131	156,393	1,696	35,431	4,553

Colorado	8,817	14	−58	1,736	572	------	6,457	8	------	------
Montana	19,775	8	−36	5,599	2,676	------	11,469	3	------	------
Utah	26,265	−7	25	1,516	305	------	24,208	254	------	------
Wyoming	32,056	92	131	30,619	1,020	------	37	603	------	------
District 4	86,913	107	62	39,470	4,573	------	42,171	868	------	------
California, Nevada, etc.; district 5	372,474	207	−1,911	277,245	7,826	66,958	------	------	------	[2] 18,741
United States total, 1954	2,539,564	2,426	−5,429	1,172,638	26,196	161,033	721,173	10,482	205,560	[3] 239,479
Daily average, 1954	6,958	7	−15	3,212	72	441	1,976	29	563	656
Daily average, 1953	7,000	7	18	3,173	72	474	1,994	31	633	648

[1] Received by pipeline.
[2] Includes 909,000 barrels received by pipeline.
[3] Includes 2,565,000 barrels received by pipeline.

TABLE 32.—Daily average total demand for crude petroleum in the United States in 1953–54, by State of origin and month

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Year
1953													
Alabama	4.1	4.6	4.8	5.5	5.5	3.0	3.8	4.7	4.5	6.1	3.0	3.5	4.4
Arkansas	86.9	84.5	84.8	82.0	84.7	85.7	75.5	82.6	75.5	77.3	78.9	84.7	81.9
California	948.4	989.5	995.8	986.6	1,020.3	952.9	1,030.1	989.0	1,030.2	1,000.0	972.4	1,004.9	993.5
Colorado	90.1	85.2	88.5	84.3	87.5	105.5	109.4	105.4	107.4	96.2	103.4	112.2	98.0
Florida	1.2	1.8	.8	3.5	.2	.1	1.8	1.9	1.3	2.3	.7	2.9	1.5
Illinois	201.0	148.5	156.9	118.1	160.1	129.0	155.9	174.5	147.3	165.8	170.2	186.2	159.8
Indiana	36.6	33.2	34.5	35.1	38.9	37.5	31.7	35.6	36.0	32.1	33.8	31.2	34.7
Kansas	316.5	309.1	335.1	322.8	315.2	353.7	343.2	320.0	300.8	269.6	308.7	297.5	316.1
Kentucky	29.3	27.4	29.8	29.7	21.4	34.1	35.7	29.7	31.3	34.5	35.3	36.5	31.2
Louisiana	711.3	698.1	680.4	751.7	703.6	731.9	692.9	675.5	703.2	690.4	677.0	697.6	701.0
Michigan	32.2	36.8	33.8	35.0	33.5	31.7	35.1	35.3	32.9	28.6	33.5	34.0	33.5
Mississippi	94.2	86.0	94.2	95.3	96.3	113.5	108.3	87.0	102.4	92.2	100.7	93.9	97.0
Missouri, Tennessee, Virginia	.2	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.3	.2
Montana	27.5	30.4	30.1	23.8	36.6	34.5	32.4	33.7	36.4	26.4	38.5	35.4	32.1
Nebraska	25.4	22.3	17.2	13.9	6.4	23.4	16.7	18.3	10.3	18.9	21.4	21.1	17.9
New Mexico	157.0	171.9	168.3	208.5	179.6	215.5	202.0	230.3	191.5	190.2	211.1	161.1	190.6
New York	10.6	10.6	11.0	11.7	7.9	9.0	11.8	10.0	12.4	9.7	9.8	9.9	10.4
North Dakota	14.3	15.9	12.8	13.3	13.5	12.7	13.8	14.8	13.8	14.1	13.4	8.1	13.3
Ohio	9.5	10.2	10.0	7.8	10.8	10.9	8.4	8.9	10.7	12.1	10.3	10.6	10.0
Oklahoma	558.3	575.4	558.7	502.1	519.8	584.2	617.7	541.8	561.6	570.5	578.1	552.5	560.0
Pennsylvania	31.1	23.3	25.2	27.8	28.8	29.3	26.6	28.3	25.7	28.1	33.3	30.8	28.2
Texas	2,946.0	2,892.7	2,893.0	2,715.6	2,858.3	2,779.3	2,762.8	2,868.4	2,725.8	2,692.3	2,763.4	2,765.6	2,805.2
Utah	5.4	5.2	5.3	5.3	5.1	4.9	4.5	4.7	4.9	4.6	4.3	4.4	4.9
West Virginia	7.4	7.2	7.3	7.3	7.9	7.5	8.4	8.6	9.6	7.1	8.5	11.1	8.2
Wyoming	196.5	221.5	198.5	197.0	222.5	201.1	242.3	254.0	267.1	239.2	234.8	226.5	225.1
Total domestic crude	6,541.0	6,491.4	6,477.0	6,283.9	6,464.6	6,491.1	6,571.0	6,563.2	6,442.8	6,308.5	6,444.7	6,422.5	6,458.7
Foreign crude	619.8	588.7	628.4	633.2	637.4	697.8	624.2	681.5	667.2	650.7	629.7	618.4	640.0
Grand total 1953	7,160.8	7,080.1	7,105.4	6,917.1	7,102.0	7,188.9	7,195.2	7,244.7	7,110.0	6,959.2	7,074.4	7,040.9	7,098.7
Pennsylvania Grade (included above)	49.2	45.9	47.4	46.6	51.5	49.8	49.9	49.3	51.6	49.7	54.8	53.8	50.0

1954 [1]													
Alabama	4.5	5.6	4.2	3.3	3.4	5.7	4.1	3.4	6.4	4.6	4.3	4.7	4.5
Arkansas	80.3	78.9	85.4	70.5	89.9	79.7	76.9	84.1	77.9	81.0	79.4	74.6	79 9
California	1,017.8	967.4	977.0	1,003.8	1,033.5	993.7	950.5	948.6	957.8	987.5	979.2	967.6	982.1
Colorado	78.8	95.4	90.8	102.6	114.5	105.3	102.4	129.2	120.6	93.0	111.5	134.8	106.6
Florida	----------	3.9	2.6	1.1	.1	----------	3.7	----------	.2	3.6	.3	3.3	1.6
Illinois	165.6	181.9	186.1	157.5	157.9	151.7	213.0	190.4	194.6	187.3	214.0	213.5	184.5
Indiana	35.3	34.6	33.5	30.2	32.6	23.6	31.1	25.5	35.8	29.5	29.8	32.6	31.2
Kansas	289.0	312.4	355.0	313.9	348.0	341.8	341.4	317.6	317.3	305.4	326.8	326.1	324.7
Kentucky	37.4	37.3	36.1	31.7	36.0	47.9	37.9	32.5	41.2	40.1	40.9	37.5	38.0
Louisiana	743.2	732.6	717.6	654.2	709.3	701.9	659.3	668.7	637.1	642.7	642.9	662.6	680.8
Michigan	36.3	35.9	29.5	30.9	37.1	31.7	35.3	32.5	29.6	34.9	33.7	33.6	33.4
Mississippi	88.8	103.9	88.1	97.2	100.5	90.3	89.2	106.5	83.9	93.9	81.2	97.1	93.4
Missouri, Tennessee, Virginia	.2	.3	.5	.4	.5	.4	.4	.5	.4	.3	.4	.4	.4
Montana	29.2	35.8	31.7	30.6	32.2	40.7	40.9	43.7	41.2	31.6	45.0	47.6	37.5
Nebraska	25.0	14.2	19.7	18.5	22.4	22.0	20.9	10.9	26.1	21.3	17.5	22.9	20.2
Nevada	----------	----------	----------	----------	----------	----------	.3	.2	.2	----------	.2	.2	.1
New Mexico	190.9	205.8	236.8	182.7	214.0	190.2	196.3	204.0	184.3	203.2	236.6	248.5	207.9
New York	8.7	9.3	9.3	9.2	7.6	5.0	8.4	8.8	9.5	11.5	12.4	8.8	9.0
North Dakota	8.8	9.0	8.3	6.5	15.4	12.9	11.5	12.0	12.0	26.1	30.1	34.8	15.7
Ohio	9.8	4.0	17.0	9.3	13.2	11.3	9.5	9.8	7.9	5.9	14.3	11.6	10.3
Oklahoma	498.2	582.5	537.9	540.4	535.1	538.8	436.6	504.1	505.6	486.5	468.1	555.2	515.2
Pennsylvania	28.0	18.4	16.7	19.3	25.6	26.9	26.5	25.6	27.3	26.6	23.4	24.0	24.1
Texas	2,798.9	2,805.2	2,620.2	2,773.2	2,670.7	2,653.1	2,638.9	2,654.6	2,720.4	2,739.4	2,788.1	2,812.0	2,722.1
Utah	4.8	6.0	5.4	5.2	5.4	5.3	5.0	4.3	5.5	5.0	5.4	5.6	5.2
West Virginia	7.2	7.5	8.3	7.3	5.6	9.9	8.3	7.3	7.4	7.5	8.8	6.9	7.7
Wyoming	244.5	237.2	251.5	227.8	253.8	284.9	287.9	275.2	259.1	234.2	255.3	242.0	254.6
Total domestic crude	6,431.2	6,525.0	6,369.2	6,327.3	6,464.3	6,374.7	6,236.2	6,300.0	6,309.3	6,302.6	6,449.6	6,608.5	6,390.7
Foreign crude	617.4	614.3	629.8	580.5	650.4	655.0	754.4	684.3	694.7	640.8	624.7	713.5	655.5
Grand total 1954	7,048.6	7,139.3	6,999.0	6,907.8	7,114.7	7,029.7	6,990.6	6,984.3	7,004.0	6,943.4	7,074.3	7,322.0	7,046.2
Pennsylvania Grade (included above)	49.0	36.1	42.4	36.4	43.4	45.4	47.3	45.1	46.5	48.6	47.8	43.1	44.3

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[1] Preliminary figures.

TABLE 33.—Total demand for crude petroleum in the United States, 1953–54, by State of origin and by month

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Alabama	127	128	150	165	171	91	117	146	134	190	91	107	1,617
Arkansas	2,694	2,366	2,627	2,459	2,627	2,571	2,339	2,560	2,266	2,397	2,366	2,625	29,897
California	29,402	27,707	30,870	29,600	31,629	28,587	31,932	30,658	30,907	31,001	29,171	31,151	362,615
Colorado	2,792	2,385	2,745	2,529	2,718	3,165	3,392	3,266	3,223	2,983	3,101	3,477	35,771
Florida	38	51	25	106	6	2	55	59	39	71	20	89	561
Illinois	6,231	4,156	4,865	3,543	4,962	3,871	4,833	5,411	4,418	5,139	5,107	5,773	58,309
Indiana	1,135	930	1,068	1,053	1,207	1,125	983	1,104	1,081	996	1,015	967	12,664
Kansas	9,813	8,656	10,388	9,686	9,772	10,612	10,640	9,921	9,024	8,359	9,263	9,224	115,358
Kentucky	910	768	923	891	664	1,024	1,106	921	938	1,070	1,060	1,130	11,405
Louisiana	22,051	19,546	21,093	22,552	21,811	21,958	21,481	20,940	21,095	21,402	20,309	21,625	255,863
Michigan	997	1,030	1,048	1,049	1,038	952	1,089	1,093	986	886	1,005	1,054	12,227
Mississippi	2,922	2,409	2,921	2,859	2,985	3,406	3,356	2,698	3,072	2,857	3,022	2,911	35,418
Montana	851	852	933	713	1,133	1,034	1,005	1,044	1,093	820	1,156	1,096	11,730
Nebraska	787	625	533	418	198	701	519	567	309	587	641	655	6,540
New Mexico	4,866	4,812	5,218	6,256	5,569	6,466	6,261	7,140	5,744	5,895	6,332	4,995	69,554
New York	329	298	342	350	245	271	365	311	374	300	295	306	3,786
North Dakota	442	444	397	398	418	381	429	460	413	436	401	252	4,871
Ohio	296	286	311	234	334	327	261	275	321	375	308	330	3,658
Oklahoma	17,306	16,112	17,318	15,064	16,113	17,525	19,150	16,795	16,848	17,685	17,344	17,129	204,389
Pennsylvania	964	653	781	833	894	879	824	876	772	872	999	954	10,301
Texas	91,326	80,995	89,684	81,467	88,608	83,379	85,648	88,922	81,776	83,461	82,902	85,734	1,023,902
Utah	167	146	164	160	157	146	138	146	147	143	130	138	1,782
West Virginia	230	201	225	219	246	224	261	266	287	219	254	344	2,976
Wyoming	6,091	6,200	6,152	5,909	6,898	6,033	7,512	7,875	8,012	7,416	7,045	7,023	82,166
Other States	5	4	5	5	5	5	6	5	5	5	5	8	[1] 63
Total domestic crude	202,772	181,760	200,786	188,518	200,403	194,735	203,702	203,459	193,284	195,565	193,342	199,097	2,357,423
Foreign crude	19,215	16,484	19,482	18,996	19,759	20,933	19,351	21,127	20,016	20,171	18,891	19,172	233,597
Grand total 1953	221,987	198,244	220,268	207,514	220,162	215,668	223,053	224,586	213,300	215,736	212,233	218,269	2,591,020
Daily average:													
Domestic	6,541	6,491	6,477	6,284	6,465	6,491	6,571	6,563	6,443	6,309	6,445	6,422	6,459
Domestic and foreign crude	7,161	7,080	7,105	6,917	7,102	7,189	7,195	7,245	7,110	6,959	7,074	7,041	7,099
Pennsylvania Grade (included above)	1,525	1,285	1,468	1,399	1,596	1,493	1,546	1,527	1,547	1,540	1,643	1,669	18,238
1954 [2]													
Alabama	141	158	130	100	105	172	126	104	193	142	130	147	1,648
Arkansas	2,489	2,208	2,646	2,116	2,788	2,392	2,383	2,608	2,337	2,512	2,383	2,314	29,176
California	31,551	27,087	30,288	30,115	32,039	29,812	29,467	29,407	28,735	30,614	29,375	29,995	358,485
Colorado	2,443	2,670	2,815	3,079	3,548	3,160	3,176	4,005	3,618	2,883	3,346	4,178	38,921

Florida	1	108	80	32	3	1	115	1	5	111	9	102	568
Illinois	5,182	5,093	5,769	4,725	4,894	4,551	6,603	5,901	5,837	5,805	6,421	6,617	67,348
Indiana	1,095	968	1,040	905	1,012	709	964	790	1,074	913	894	1,010	11,374
Kansas	8,958	8,748	11,006	9,417	10,788	10,254	10,584	9,845	9,519	9,468	9,805	10,108	118,500
Kentucky	1,158	1,043	1,118	952	1,117	1,436	1,174	1,009	1,237	1,244	1,227	1,163	13,878
Louisiana	23,038	20,513	22,246	19,624	21,988	21,057	20,439	20,729	19,114	19,925	19,288	20,541	248,502
Michigan	1,124	1,006	914	928	1,151	950	1,095	1,006	888	1,082	1,011	1,042	12,197
Mississippi	2,752	2,908	2,732	2,914	3,115	2,710	2,764	3,303	2,518	2,911	2,436	3,010	34,073
Montana	904	1,003	984	917	999	1,220	1,268	1,354	1,237	978	1,351	1,474	13,689
Nebraska	776	399	612	556	693	660	649	339	783	660	525	709	7,361
Nevada	------	------	------	------	------	------	9	6	5	------	6	7	33
New Mexico	5,918	5,761	7,341	5,482	6,634	5,705	6,085	6,324	5,529	6,299	7,097	7,703	75,878
New York	270	261	289	275	236	149	259	272	286	357	371	273	3,298
North Dakota	274	253	256	196	477	387	356	372	361	809	902	1,080	5,723
Ohio	305	112	527	279	409	339	294	305	236	183	428	359	3,776
Oklahoma	15,443	16,311	16,675	16,212	16,588	16,164	13,535	15,628	15,166	15,081	14,042	17,211	188,056
Pennsylvania	869	516	517	580	792	807	822	795	820	824	701	744	8,787
Texas	86,767	78,545	81,225	83,196	82,791	79,593	81,806	82,294	81,612	84,922	83,643	87,173	993,567
Utah	148	167	167	156	167	158	156	134	164	156	162	175	1,910
West Virginia	224	211	258	219	175	296	256	227	221	232	265	215	2,799
Wyoming	7,580	6,643	7,796	6,833	7,868	8,547	8,925	8,530	7,773	7,261	7,659	7,503	92,918
Other States	7	8	15	11	15	12	11	14	12	10	12	12	[3] 139
Total domestic crude	199,367	182,700	197,446	189,819	200,392	191,241	193,321	195,302	189,280	195,382	193,489	204,865	2,332,604
Foreign crude	19,141	17,200	19,525	17.415	20,163	19,649	23,387	21,213	20,842	19,865	18,740	22,118	239,258
Grand total 1954	218,508	199,900	216,971	207,234	220,555	210,890	216,708	216,515	210,122	215,247	212,229	226,983	2,571,862
Daily average:													
Domestic	6,431	6,525	6,369	6,327	6,464	6,375	6,236	6,300	6,309	6,303	6,450	6,608	6,391
Domestic and foreign crude	7,049	7,139	6,999	6,908	7,115	7,030	6,991	6,984	7,004	6,943	7,074	7,322	7,046
Pennsylvania Grade (included above)	1,520	1,010	1,315	1,093	1,344	1,363	1,465	1,398	1,394	1,508	1,433	1,336	16,179

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[1] Missouri (39), Tennessee (16), and Virginia (8).

[2] Preliminary figures.

[3] Missouri (78), South Dakota (34), Tennessee (17), and Virginia (10).

Exports dropped from about 6 million barrels in 1953 to 2 million in 1954. The decline of almost 10 million barrels in the receipts of foreign crude was an important factor in preventing a greater decrease in the demand for California crude oil.

Louisiana, the third ranking State, furnished 10.6 percent of the total demand for domestic crude in 1954, compared with 10.8 percent in 1953, a decline of 3 percent. Total receipts of Louisiana crude at refineries were 240 million barrels in 1954, a decline of about 8 million barrels or 3 percent. Intrastate receipts, representing 56 percent of total receipts in 1954 and 53 percent in 1953, increased about 4 million barrels, and deliveries to refineries in other States decreased 11 million barrels. The major declines in outside markets were 11 million barrels in the Texas Gulf district and 4 million in the Indiana-Illinois district, while receipts in the East Coast district increased 4 million barrels.

Oklahoma, the fourth State in importance, furnished 8.1 percent of the total demand for domestic crude oil in 1954, compared with 8.7 percent, a drop of 8 percent. Although there was no change in crude runs in Oklahoma, the intrastate deliveries fell about 3 million barrels, and receipts from Kansas and New Mexico increased. The largest decreases in shipments of Oklahoma crude to refineries in other States occurred in the Texas Gulf and Appalachian districts. The gains in the demand for Illinois and Kansas crudes replaced part of the normal market for Oklahoma crude.

Kansas ranked fifth in the demand for domestic crude oil, with 5.1 percent of the total in 1954 compared with 4.9 percent in 1953—a gain of about 3 percent. Total deliveries to refineries were 122 million barrels in 1954; 53 percent went to refineries in the State and 47 percent to refineries in other States. The interstate receipts of Kansas crude increased about 7 million barrels, including gains of 4 million in the Indiana-Illinois district, 2 million in the Appalachian district, and 1 million in Oklahoma.

Wyoming was sixth in importance in 1954, with 4.0 percent of the total demand for domestic crude compared with 3.5 percent in 1953, a 13-percent increase in demand. The increase of about 11 million barrels in refinery receipts of Wyoming crude in 1954 included gains of 15 million barrels in receipts in the Indiana-Illinois district and about 2 million in the Rocky Mountain district—1 million in Wyoming and 1 million in other Mountain States. Receipts in the Oklahoma-Kansas district dropped about 6 million barrels. The rapid increase in the production of Wyoming crude in 1953 and 1954 has found a market by increased pipeline movements to the Indiana-Illinois district.

The demand for New Mexico crude rose from 3.0 percent of the total demand for domestic crude in 1953 to 3.3 percent in 1954, with a 9-percent gain in 1954. Since less than 6 million barrels of New Mexico crude was received by refineries within the State, the major markets were outside the State. Of the total interstate receipts of 64 million barrels in 1954, 49 million went to refineries in Texas and 12 million to refineries in the Indiana-Illinois district.

Illinois ranked eighth in the demand for domestic crude oil, with 2.9 percent of the total in 1954 and 2.5 percent in 1953, a gain of almost 16 percent. About 37 percent of the deliveries of Illinois crude was refined in the State. The major outside markets were in the refineries in Ohio, Michigan, and Indiana. The large increase in demand in 1954 was due to comparison with low demand in 1953 (a 9-percent decline) and to the markets left open by the reduced supply of Oklahoma crude in 1954.

The demand for Colorado crude, the ninth State in importance, has increased steadily since 1950. Colorado supplied 1.7 percent of the total demand for domestic crude in 1954 compared with 1.5 percent in 1953, a gain of 9 percent. The largest demand for Colorado crude was in the Utah refineries, but the major gain was in deliveries to refineries in Ohio, Illinois, and Michigan.

STOCKS

The total stocks of all oils declined 10.6 million barrels in 1954, which included a decline of 16.1 million in crude stocks and gains of 3.6 million in stocks of liquid derived from natural gas and 1.9 million in stocks of refined products.

The decrease in crude stocks included a decline of 16.3 million barrels in domestic crude stocks and a gain of 0.2 million in foreign crude stocks. The principal changes in domestic crude stocks, by States of origin, were declines of 11.9 million barrels for Texas, 2.7 million for California, 2.4 million for Louisiana, and 1.7 million for Oklahoma, while the largest increase was 2.1 million barrels for Colorado. The unusual decline in crude stocks resulted in a larger relative decline in crude production than in crude demand.

To compare the indicated demand for crude oil with actual requirements, the change in product stocks must be considered. The abnormal increase of almost 47 million barrels in product stocks in 1953 inflated the indicated demand for crude oil materially above normal requirements, whereas the increase of less than 2 million barrels in product stocks in 1954 indicates a balanced relation between indicated demand and actual requirements for crude oil.

TABLE 34.—Stocks of crude petroleum, natural-gas liquids, and refined products in continental United States at end of year, 1950–54 [1]

(Thousand barrels)

Product	1950	1951	1952	1953	1954
Crude petroleum:					
At refineries	63,328	62,311	66,275	72,738	67,309
Pipeline and tank-farm	167,941	175,481	187,852	[2] 182,934	172,081
Producers	17,194	17,991	17,801	18,773	18,995
Total crude petroleum	248,463	255,783	271,928	[2] 274,445	258,385
Natural-gas liquids	7,355	8,186	7,807	10,428	14,038
Refined products	326,892 [3] 341,300	351,146 [3] 370,140	394,019	440,634	442,510
Grand total	582,710 [3] 597,118	615,115 [3] 634,109	673,754	[2] 725,507	714,933

[1] Final figures.
[2] Revised.
[3] New basis, for comparison with subsequent years.

TABLE 35.—Stocks of crude petroleum in continental United States in 1954, by State of origin and month [1]

(Thousand barrels)

State of origin	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	166	168	141	150	180	211	173	180	198	139	127	120	102
Arkansas	2,811	2,758	2,857	2,767	3,096	2,830	2,898	3,161	2,927	2,892	2,750	2,760	2,841
California	34,142	33,589	34,435	34,798	34,283	32,777	32,317	32,873	33,146	33,214	32,320	31,686	31,436
Colorado	2,218	2,513	2,610	2,945	3,049	3,195	3,751	4,229	3,835	3,646	4,373	4,768	4,349
Florida	87	132	68	35	42	93	138	71	119	157	92	125	67
Illinois	11,318	11,346	11,204	10,909	11,597	12,310	13,434	12,377	11,950	11,566	11,794	11,391	10,968
Indiana	503	416	371	329	376	328	520	455	584	380	370	396	333
Kansas	7,964	8,443	8,894	8,326	9,016	8,446	8,285	8,005	8,098	8,221	8,704	8,807	8,781
Kentucky	1,631	1,539	1,537	1,600	1,788	1,817	1,549	1,523	1,653	1,566	1,527	1,490	1,544
Louisiana	17,478	16,035	14,942	14,341	16,303	16,662	16,805	16,822	15,940	15,393	14,917	14,974	15,069
Michigan	981	872	829	955	1,060	909	980	885	889	975	871	835	811
Mississippi	3,304	3,461	3,192	3,371	3,245	2,991	3,042	3,112	2,561	2,724	2,605	2,925	2,822
Montana	1,202	1,186	1,185	1,311	1,463	1,541	1,411	1,417	1,328	1,281	1,460	1,327	1,200
Nebraska	734	538	694	619	643	538	555	533	817	681	687	800	796
New Mexico	7,782	8,045	7,854	6,775	7,342	6,978	7,512	7,855	7,932	8,497	8,632	8,194	7,104
New York	154	157	153	157	162	199	322	328	323	324	228	119	113
North Dakota	457	640	807	1,019	1,243	1,206	1,225	1,309	1,381	1,456	1,239	1,000	713
Ohio	619	615	812	621	679	610	616	621	583	649	791	694	672
Oklahoma	25,869	26,602	25,678	26,391	27,115	27,213	25,598	26,690	26,160	25,464	25,247	25,974	24,162
Pennsylvania	1,776	1,743	1,936	2,254	2,485	2,483	2,467	2,415	2,374	2,282	2,162	2,143	2,096
Texas	127,807	122,306	118,803	123,558	125,860	127,860	131,904	131,826	129,938	126,532	121,553	118,849	115,962
Utah	68	64	54	61	65	61	65	69	68	64	61	49	31
West Virginia	500	542	571	573	593	644	596	582	609	634	631	596	603
Wyoming	13,713	13,660	13,646	13,664	14,465	14,449	13,947	13,488	13,301	13,224	13,636	13,633	14,428
Total domestic	263,284	257,370	253,273	257,529	266,150	266,351	270,110	270,826	266,714	261,961	256,777	253,655	247,003
Foreign [2]	11,161	11,161	11,356	12,091	11,905	13,699	12,778	11,839	11,215	10,541	10,569	10,911	11,382
Grand total	274,445	268.531	264,629	269,620	278,055	280,050	282,888	282,665	277,929	272,502	267,346	264,566	258,385
Pennsylvania Grade (included above)	2,687	2,639	2,942	3,131	3,482	3,542	3,595	3,521	3,505	3,457	3.259	3,106	3,056

[1] Final figures.

[2] Includes foreign crude petroleum held in District 5: December 1953, 2,819,000; January, 2,687,000; February, 2,867,000; March, 2,560,000; April ,2,264,000; May, 2,911,000; June, 2,661,000; July, 2,961,000; August, 3,282,000; September, 2,761,000; October, 3,039,000; November, 3,097,000 and December, 3,069,000 barrels.

TABLE 36.—Stocks of crude petroleum in continental United States in 1954, by location and month[1]

(Thousand barrels)

State	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	407	622	460	591	619	562	401	515	406	422	578	551	609
Arkansas	2,316	2,421	2.376	2,254	2,456	2,465	2,470	2,443	2,258	2,232	2,194	2,419	2,375
California, Oregon, Washington	36,961	36,276	37,302	37,358	36,547	35,688	34,978	35,834	36,428	35,307	35,359	34,783	34,505
Colorado	801	794	733	853	809	812	878	993	975	892	1,023	1,149	1,146
Florida, Georgia, South Carolina	358	309	291	380	356	410	426	356	321	314	253	378	306
Illinois	18,072	17,701	18,179	17,335	18,362	18,147	18,979	18,398	18,171	18,330	17,909	17,299	16,912
Indiana	3,586	4,212	4,174	4,429	4,694	4,687	4,850	4,585	4,524	4,781	4,748	4,641	4,518
Iowa, Missouri	6,821	6,601	6,653	6,663	6,770	6,954	7.073	7,242	7,234	7,449	7,529	7,123	6,690
Kansas	9,844	9,751	9,610	9,988	10,468	9,902	10,131	9,825	9,352	9,417	10,341	10,913	10,056
Kentucky, Tennessee	3,309	3,451	3,302	3,102	3,466	3,316	3,210	3,276	3,136	2,992	3,107	3,127	3,082
Louisiana	14,665	13,649	12,445	13,057	13,810	13,371	13,989	14,513	13,788	13,670	14,009	13,924	13,965
Maryland	1,367	1,067	1,370	1,257	1,070	1,197	993	1,057	959	938	771	1,043	938
Massachusetts, Rhode Island	632	580	703	581	438	534	721	539	710	504	777	619	622
Michigan	1,456	1,291	1,259	1,435	1,517	1,360	1,462	1,291	1,279	1,405	1,350	1,280	1,279
Minnesota, Wisconsin	263	205	260	205	279	231	272	320	235	253	417	337	189
Mississippi	1,771	1,792	1,724	1,727	1,735	1,739	1,672	1,675	1,683	1,741	1,566	1,738	1,623
Montana	1,549	1,414	1,429	1,488	1,674	1,520	1,542	1,625	1,632	1,471	1,674	1,486	1,516
Nebraska	1,777	1,819	1,769	1,683	1,581	1,694	1,905	1,804	1,674	1,720	1,758	1,734	1,828
New Jersey	6,581	6,163	5,923	6,958	7,661	7,255	6,359	5,771	5,207	5,081	5,207	5,389	5,611
New Mexico	2,134	1,947	1,905	1,912	2,038	2,012	2,163	2,006	2,096	2,183	2,403	2,255	2,323
New York	1,263	1,180	1,189	1,275	1,272	1,138	1,512	1,362	1,025	1.092	1,173	771	1,076
North Dakota	430	512	570	677	808	916	968	1,064	1,195	1,200	1,093	895	639
Ohio	7,301	7,883	7,757	8,580	8,793	9,797	9,816	9,024	9,049	8,460	8,312	8,555	8,049
Oklahoma	27,640	26,436	26,227	26,993	28,014	29,083	28,393	28,712	29,139	28,733	27,488	26,620	25,346
Pennsylvania	9,523	9,657	9,483	10,362	10,608	11,897	12,198	11,382	10,283	10,191	9,040	10,024	9,798
Texas	102,942	99,967	96,589	97,243	100,172	101,671	104,174	105,936	104,559	101,541	97,142	94,748	92,540
Utah	765	721	620	657	670	688	704	801	839	784	727	747	747
West Virginia	697	688	697	733	816	808	865	785	736	672	699	664	666
Wyoming	9,214	9,422	9,630	9,844	10,552	10,196	9,784	9,531	9,036	8,727	8,699	9,354	9,431
Total	274,445	268,531	264,629	269,620	278,055	280,050	282,888	282,665	277,929	272,502	267,346	264,566	258.385

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[1] Final figures.

TABLE 37.—Stocks of crude petroleum in continental United States in 1954, by classification and location [1]

(Thousand barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
At refineries:													
Alabama	240	198	261	348	335	234	269	205	209	254	347	288	241
Arkansas	426	400	461	392	617	553	501	528	453	570	546	597	620
California, Oregon, Washington	14,625	13,791	14,747	14,598	14,243	14,550	14,032	14,925	14,470	13,115	13,190	12,781	12,714
Colorado	238	236	181	265	257	224	188	307	237	177	269	209	180
Georgia, South Carolina	271	177	223	264	314	317	288	285	202	268	161	253	239
Illinois	3,957	4,017	4,261	4,347	4,717	4,383	4,316	4,370	3,836	3,742	4,006	3,845	3,712
Indiana	1,547	1,805	1,849	1,989	1,917	1,781	1,924	1,715	1,778	1,874	1,659	1,778	1,737
Kansas	1,498	1,597	1,541	1,445	1,941	1,710	1,638	1,422	1,112	1,094	1,357	1,494	1,343
Kentucky, Tennessee	1,335	1,551	1,422	1,170	1,478	1,202	1,231	999	1,052	971	915	897	835
Louisiana	5,068	4,905	4,309	4,200	4,869	4,533	4,940	5,383	4,858	5,117	5,544	5,387	5,095
Maryland	1,367	1,067	1,370	1,257	1,070	1,197	993	1,057	959	938	771	1,043	938
Massachusetts, Rhode Island	632	580	703	581	438	534	721	539	710	504	777	619	622
Michigan	622	560	484	600	630	544	633	562	580	578	556	571	558
Minnesota, Wisconsin	263	205	260	205	279	231	272	320	235	253	417	337	189
Mississippi	19	21	22	21	21	20	16	11	26	23	21	16	23
Missouri	313	305	271	246	279	296	311	302	343	299	328	352	264
Montana	690	615	634	621	747	612	611	691	605	554	789	652	654
Nebraska	53	49	40	48	54	54	29	21	42	42	38	44	25
New Jersey	6,206	5,773	5,419	6,453	7,185	6,780	5,905	5,311	4,703	4,580	4,708	4,947	5,171
New Mexico	163	155	163	154	191	210	178	150	122	89	184	157	154
New York	1,086	927	927	1,044	1,019	903	1,275	1,110	794	911	962	524	841
North Dakota	67	156	212	311	466	584	657	767	921	913	751	542	287
Ohio	1,236	1,250	1,373	1,968	1,760	2,107	2,323	1,927	2,008	1,731	1,529	1,826	1,851
Oklahoma	5,284	5,087	5,144	4,780	4,752	4,474	3,883	4,186	4,233	4,383	4,070	4,000	4,690
Pennsylvania	7,838	7,842	7,689	8,235	8,222	9,540	9,931	9,163	8,031	8,013	7,080	8,041	7,787
Texas	16,315	16,029	15,734	16,174	16,539	16,507	16,704	16,930	16,746	15,656	15,855	15,085	14,996
Utah	610	568	468	502	523	518	554	624	645	608	564	591	635
West Virginia	48	51	52	39	43	53	48	43	43	52	30	58	56
Wyoming	721	744	696	811	946	852	816	721	706	680	868	880	852
Total at refineries	72,738	70,661	70,916	73,068	75,852	75,503	75,187	74,574	70,659	67,989	68,292	67,814	67,309
Pipeline and tank-farm stocks:													
Alabama	153	409	185	231	272	313	118	296	179	152	214	249	355
Arkansas	1,515	1,631	1,530	1,482	1,454	1,527	1,589	1,520	1,425	1,287	1,273	1,452	1,385
California	17,612	17,713	18,149	18,342	17,817	16,653	16,451	16,434	17,377	17,585	17,544	17,341	17,094
Colorado	378	393	407	393	347	383	495	471	523	490	524	715	736
Florida, New Jersey	449	509	554	606	501	553	582	517	610	537	577	553	493
Illinois	13,540	13,094	13,338	12,423	13,080	13,164	14,083	13,408	13,715	13,968	13,278	12,864	12,615
Indiana	1,954	2,317	2,240	2,355	2,692	2,821	2,856	2,805	2,681	2,842	3,024	2,798	2,716
Iowa, Missouri	6,508	6,296	6,382	6,417	6,491	6,658	6,762	6,940	6,891	7,150	7,201	6,771	6,426
Kansas	7,261	7,139	7,094	7,593	7,572	7,182	7,518	7,408	7,240	7,348	7,964	8,449	7,823
Kentucky, Tennessee	1,899	1,825	1,805	1,857	1,913	2,039	1,904	2,197	2,004	1,936	2,112	2,150	2,172
Louisiana	8,052	7,054	6,516	7,272	7,341	7,218	7,459	7,535	7,345	7,058	6,875	7,077	7,270

Michigan	664	496	605	665	727	651	669	574	534	667	629	544	566
Mississippi	1,352	1,356	1,277	1,296	1,304	1,289	1,231	1,249	1,222	1,283	1,100	1,287	1,185
Montana	634	574	570	647	712	688	716	709	762	652	615	544	592
Nebraska	1,639	1,710	1,669	1,575	1,467	1,580	1,811	1,713	1,562	1,608	1,645	1,625	1,733
New Mexico	1,276	1,092	1,032	1,048	1,122	1,067	1,250	1,106	1,234	1,354	1,494	1,343	1,389
New York	147	223	232	201	223	205	207	222	201	151	181	217	205
North Dakota	200	199	197	201	201	200	200	199	196	206	210	198	192
Ohio	5,985	6,553	6,304	6,532	6,953	7,610	7,413	7,012	6,961	6,649	6,698	6,644	6,113
Oklahoma	20,906	19,819	19,573	20,748	21,797	23,094	23.035	23,046	23,426	22,880	21,888	21,195	19,211
Pennsylvania	1,535	1,615	1,634	1.972	2,236	2,197	2,112	2,064	2.097	2,028	1,805	1.828	1,861
Texas	80,722	77,908	74,740	75,064	77,763	78,969	81,150	82,751	81,643	79,665	74,822	73,293	71,404
Utah	136	136	141	140	131	155	132	160	174	160	144	142	96
West Virginia	484	472	480	524	608	590	652	577	528	455	509	441	440
Wyoming	7,933	8,063	8,299	8,473	9,016	8,764	8,393	8,210	7,730	7,457	7,256	7,939	8,009
Total pipeline and tank-farm stocks	182,934	178,596	174.953	178,057	183,740	185,570	188,788	189.123	188,260	185,568	179,582	177,659	172,081
Producers' stocks	18,773	19,274	18,760	18,495	18.463	18,977	18,913	18,968	19.010	18,945	19,472	19,093	18,995
Grand total: 1954	274,445	268,531	264,629	269.620	278,055	280,050	282,888	282,665	277,929	272,502	267,346	264,566	258,385
1953	271.928	272,250	273,589	275,665	278.943	278,575	281,744	282,915	283,666	287,694	285,490	280,817	274,445

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[1] Final figures.

VALUE AND PRICE

The average value of crude petroleum at the well rose from $2.53 per barrel in 1952 to $2.68 in 1953 and $2.77 per barrel in 1954. The increase in the total value of crude petroleum at the well—from $6.3 billion in 1953 to $6.4 billion in 1954—was the result of a 41-million-barrel decline in production and an increase of 9 cents per barrel in value.

The posted prices of the representative grades of crude petroleum shown indicate some declines and no increases in posted prices during 1954. The increase in average value at the well, compared with 1953, is due to the fact that most increases in 1953 were effective for the latter half of the year only, whereas they covered a full year in 1954.

TABLE 38.—Value of crude petroleum at wells in the United States, 1953–54, by States

State	1953		1954 [1]	
	Total (thousand dollars)	Average per barrel	Total (thousand dollars)	Average per barrel
Arkansas	77,170	$2.60	79,730	$2.73
California	909,060	2.49	902,900	2.55
Colorado	98,650	2.71	113,710	2.77
Illinois	170,590	2.89	199,650	2.98
Indiana	37,570	2.93	33,160	2.96
Kansas	308,180	2.69	335,280	2.81
Kentucky	33,520	2.91	40,270	2.92
Louisiana:				
Gulf Coast	603,850	2.82	602,980	2.94
Northern	117,300	2.76	118,070	2.88
Total Louisiana	721,150	2.81	721,050	2.93
Michigan	35,870	2.92	35,600	2.96
Mississippi	84,060	2.36	83,980	2.50
Montana	26,020	2.18	30,110	2.20
Nebraska	17,190	2.71	20,410	2.75
New Mexico	185,260	2.63	206,800	2.75
New York	16,260	4.28	11,140	3.42
North Dakota	10,370	2.00	12,790	2.14
Ohio	9,710	2.69	10,570	2.76
Oklahoma	546,940	2.70	519,910	2.79
Pennsylvania	45,680	4.29	31,150	3.42
Texas:				
Gulf Coast	657,870	2.89	639,860	3.02
West Texas	1,032,090	2.64	1,046,390	2.77
East Texas proper	251,360	2.77	236,470	2.89
Other districts	836,580	2.70	868,750	2.80
Total Texas	2,777,900	2.73	2,791,470	2.84
West Virginia	11,570	3.81	8,500	2.93
Wyoming	195,800	2.37	229,400	2.45
Alabama, Florida, Missouri, Nevada, South Dakota, Tennessee, Utah, Virginia	8,580	2.09	9,560	2.31
Grand total	6,327,100	2.68	6,427,140	2.77

[1] Preliminary figures.

TABLE 39.—Posted price per barrel of petroleum at wells in the United States in 1954, by grades, with date of change

Date	Pennsylvania Grade		Corning Grade in Buckeye Pipe Line Co.[3]	Western Kentucky[3]	Illinois Basin[4]	Midland Michigan[5]	Oklahoma-Kansas[6]	
	Bradford and Allegany districts[1]	In Southwest Pennsylvania[2]					34°-34.9°	36°-36.9°
Jan. 1	$3.76	$3.31	$2.72	$3.02	$3.02	$3.10	$2.78	$2.82
May 15	3.00							
May 20		2.81						
Sept. 1	3.23							
Oct. 1				2.90				
Oct. 16						3.04		
Oct. 23					2.95			
Dec. 1	3.35	2.93						

Date	Panhandle Texas (Carson, Gray, Hutchinson, and Wheeler Counties) 35°-35.9°[7]	West Texas, 30°-30.9° (sweet)[7]	Lea County, N. Mex., 30°-30.9°[7]	South Texas, Duval-Mirando, 24°-24.9°[7]	East Texas[7]	Gulf Coast[8]			
						Conroe, Tex.	Texas, 30°-30.9°	Texas, 20°-20.9°	Louisiana, 30°-30.9°
Jan. 1	$2.80	$2.63	$2.63	$2.88	$2.90	$3.13	$2.90	$2.70	$2.85

Date	Rodessa, La., 36°-36.9[9]	Smackover, Ark.[10]	Elk Basin, Wyo., 30°-30.9° (heavy)[4]	Salt Creek, Wyo., 36°-36.9° (light)[11]	California[12]			
					Coalinga, 32°-32.9°	Kettleman, 37°-37.9°	Midway-Sunset, 19°-19.9°	Wilmington, 24°-24.9°
Jan. 1	$2.82	$2.33	$2.39	$2.82	$3.05	$3.30	$2.20	$2.62

[1] The Tide Water Associated Oil Co.
[2] The South Penn Oil Co.
[3] Sohio Corp.
[4] The Ohio Oil Co.
[5] The Pure Oil Co.
Standard Oil Co. (Indiana).
[7] Humble Oil & Refining Co.
[8] The Texas Co.
[9] Esso Standard Oil Co.
[10] Arkansas Fuel Oil Co.
[11] Stanolind Oil & Gas Co.
[12] Standard Oil Co. of California.

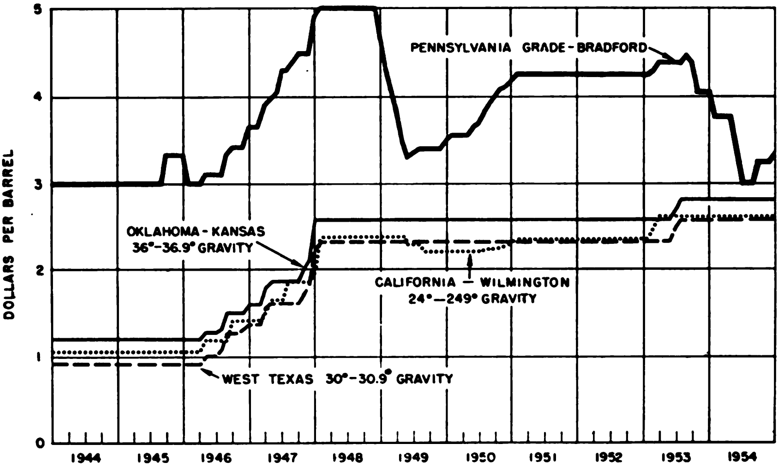

FIGURE 5.—Posted prices of selected grades of crude petroleum in the United States, 1944–54, by months.

REFINED PRODUCTS

GENERAL REVIEW

Petroleum reaches consumers in a variety of finished products that must be considered individually, relative to their competition with each other and with other sources of fuel and power. Important factors in analyzing trends are the annual adjustments in demand because of abnormal weather or fluctuations in industrial requirements and the causes for variations in the normal seasonal pattern of supply. Sharp variations among the major oil products occur in all these respects.

Gasoline is predominantly related to highway transport, aviation, and farm-tractor use. The demand for kerosine (a product defined as meeting lamp-oil specifications for color and flash point) has been drastically affected by the increase in electric lighting and by competition with natural gas and liquefied gases for cooking, water heating, and small-space heating. Distillate fuel oil, including light diesel oils, is used for space heating and as fuel for diesel locomotives and is

TABLE 40.—Salient statistics of the major refined petroleum products in continental United States, 1950–54

(Thousand barrels)

Product	1950	1951 [1]	1951 [2]	1952 [3]	1952 [4]	1953	1954 [5]
Gasoline (finished and natural):							
Production	1,024,462	1,140,843	1,140,843	1,192,097	1,178,027	1,266,376	1,269,152
Imports	156	463	463	1,761	1,761	459	1,185
Exports	24,721	40,136	40,136	36,285	36,285	37,925	34,463
Stocks, end of year	116.024	125,243	135,306	135,599	134,737	157,872	155,400
Domestic demand	994,290	1,091,951	1,089,566	1,157,280	1,142,987	1,205,775	1,238,346
Kerosine:							
Production	118,512	135,742	135,742	132,300	128,767	123,200	122,305
Imports	245	----------	----------	----------	----------	----------	----------
Exports	2,078	6,843	6,843	7,821	7,821	7,265	4,903
Stocks, end of year	19,723	24,928	27,088	26,842	26,529	[6] 28,684	27.826
Domestic demand	117,844	123,694	123,241	124,725	121,253	114,467	118,260
Distillate fuel oil:							
Production	398,912	475,801	475,801	520,378	517,920	528,111	542.278
Transfers from crude	2,537	2,863	2,863	2.705	2,705	1,966	1,500
Imports	2,602	1,767	1,767	2,742	2,742	3,379	3,195
Exports	12,653	22,555	22,555	33,515	33,515	32,328	24,201
Stocks, end of year	71,948	80,722	86,619	99,582	99,375	[6] 111,741	108,144
Domestic demand	394,885	449,102	447,278	479,347	476,986	488,075	526,369
Residual fuel oil:							
Production	425,217	469,377	469,377	453,897	453,897	449,979	416,757
Transfers from crude	5,325	6,006	6,006	6,343	6,343	5,617	5,924
Imports	120,036	119,166	119,166	128,479	128,479	131,533	129,009
Exports	16,228	28,999	28,999	27,701	27,701	25.991	26,856
Stocks, end of year	40,750	41,979	42,853	48,706	48,706	49,370	52,105
Domestic demand	553,793	564,321	564,397	555,165	555,165	560,474	522,099
Jet fuel:							
Production	----------	----------	----------	----------	20,929	35,747	46,550
From gasoline	----------	----------	----------	----------	14,938	25,086	32,889
From kerosine	----------	----------	----------	----------	3,533	6,551	9,934
From distillate	----------	----------	----------	----------	2,458	4,110	3,727
Exports	----------	----------	----------	----------	----------	409	149
Stocks, end of year	----------	----------	----------	----------	[7] 1,811	2,666	3,215
Domestic demand	----------	----------	----------	----------	[8] 20,126	34,483	45,852
Lubricants:							
Production	51,735	61,489	61,489	55,600	55,600	52,545	53,243
Imports	----------	----------	----------	----------	----------	----------	1
Exports: Grease	383	447	447	451	451	325	410
Exports: Oil	13,869	16,982	16,982	15,580	15,580	12,674	14,758
Stocks, end of year	7,849	9,617	9,617	11,021	11,021	10,070	9,702
Domestic demand	38,853	42,292	42,292	38,165	38,165	40,497	38,444

See footnotes at end of table.

TABLE 40.—Salient statistics of the major refined petroleum products in continental United States, 1950–54—Continued

Product	1950	1951 [1]	1951 [2]	1952 [3]	1952 [4]	1953	1954 [5]
Wax (1 barrel=280 pounds):							
Production	4,462	4,814	4,814	4,331	4,331	4,978	5,290
Imports	-----	-----	-----	-----	-----	-----	1
Exports	1,193	1,349	1,349	1,036	1,036	1,126	1,340
Stocks, end of year	504	723	723	575	575	538	562
Domestic demand	3,238	3,246	3,246	3,443	3,443	3,889	3,927
Coke (5 barrels=1 short ton):							
Production	17,224	18,977	18,977	18,123	18,123	21,607	24,284
Exports	2,493	4,385	4,385	4,205	4,205	3,661	3,275
Stocks, end of year	408	519	519	513	513	860	2,107
Domestic demand	15,021	14,481	14,481	13,924	13,924	17,599	19,762
Asphalt: (5.5 barrels=1 short ton):							
Production	58,240	66,302	66,302	70,312	70,312	72,409	74,912
Imports	1,795	2,462	2,462	2,697	2,697	2,502	3,463
Exports	983	1,258	1,258	2,301	2,301	1,710	1,871
Stocks, end of year	5,293	6,620	6,620	6,321	6,321	7,314	7,175
Domestic demand	58,677	66,179	66,179	71,007	71,007	72,208	76,643
Road oil:							
Production	6,928	6,100	6,100	6,998	6,998	6,594	7,213
Stocks, end of year	397	402	402	453	453	437	434
Domestic demand	6,897	6,095	6,095	6,947	6,947	6,610	7,216
Still gas (1 barrel=3,600 cu. ft.):							
Production	83,743	96,294	96,294	95,275	95,275	102,243	102,552
Liquefied gases:							
Production [9]	29,083	33,045	33,045	30,968	30,968	33,306	34,169
Transfers of liquefied gas [10] from natural-gasoline plants	58,184	70,341	70,341	79,708	79,708	88,512	86,549
Exports	1,632	2,121	2,121	2,402	2,402	3,002	3,939
Stocks, end of year	657	668	668	638	638	792	941
Domestic demand	85,505	101,254	101,254	108,304	108,304	118,662	116,630
Miscellaneous:							
Production	4,717	7,201	7,201	7,258	7,258	9,091	11,013
Exports	250	373	373	195	195	244	292
Stocks, end of year	808	1,071	1,071	1,036	1,036	1,001	1,236
Domestic demand	4,394	6,565	6,565	7,098	7,098	8,882	10,486
Unfinished gasoline:							
Rerun (net)	[11] 243	353	353	[11] 489	([12])	([12])	([12])
Stocks, end of year	8,100	7,747	7,747	8,236	([12])	([12])	([12])
Other unfinished oils:							
Rerun (net)	6,891	11,367	11,367	4,136	4,136	422	7,974
Transfers of other products from natural-gasoline plants	2,927	3,411	3,411	4,110	4,110	4,236	4,772
Imports	7,713	5,263	5,263	3,237	3,237	3,171	7,576
Stocks, end of year	61,786	59,093	59,093	62,304	62,304	69,289	73,663
Shortage	(712)	(2,648)	(2,648)	(2,552)	(2,552)	(7,184)	(8,468)

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[1] Figures are on 1950 basis and comparable with preceding years.

[2] Figures of stocks and demand are on new basis because of redefinition of bulk terminals. Stock figures as of Jan. 1, 1951, are as follows: gasoline, 123,702,000 barrels; kerosine, 21,430,000; distillate fuel oil, 76,021,000; residual fuel oil, 41,700,000.

[3] Figures are on comparable basis with 1951.

[4] Figures on 1953 basis because figures being shown separately for jet fuel, and unfinished gasoline is included with gasoline; total stocks as of Jan. 1, 1952, 134,221,000 barrels; kerosine, 26,836,000; distillate fuel oil, 86,509,000.

[5] Preliminary figures.

[6] Stock figures as of Jan. 1, 1953, were changed to 27,216,000 barrels for kerosine and 98,688,000 barrels for distillate fuel oil, new basis, because one company reported incorrectly.

[7] Stock figure on Jan. 1, 1952 was 1,008,000 barrels included in gasoline, kerosine, and distillate fuel oil on Dec. 31, 1951.

[8] Includes exports of 42,526 barrels not included in total United States exports for the year.

[9] Liquefied refinery gases.

[10] Liquefied petroleum gases.

[11] Negative quantity; represents net excess of unfinished oils produced over unfinished oils rerun.

[12] Included with gasoline (finished and natural).

replacing residual fuel oil and coal for railroad use. Residual fuel oil, a product that usually sells for less than the cost of crude oil at refineries, competes directly with natural gas and coal for heavy fuel uses. Since it cannot be moved by pipeline, distribution depends primarily on cheap water transport and limited tank-car movements that are too costly for competition in coal-producing areas, except for special uses. Liquefied gases compete with kerosine and light distillate fuel, are used as a raw material for synthetic rubber and chemical products, and may be used as a motor fuel. Jet fuels—a blend of low-grade gasoline, kerosine, and distillate fuel—are replacing aviation gasoline in military use.

The record total demand for petroleum and refined products showed a comparatively small gain of 1.3 percent in 1954, including a 11.3-percent decline in exports and a 1.9-percent gain in domestic demand in continental United States.

The exports of refined products, after rising sharply in 1951 and 1952, have continued to drop. The 8.1-percent decrease in 1954 resulted from the further expansion of refinery output outside the United States. Crude-oil exports showed a further decline of 31.9 percent in 1954, resulting from the increased production of foreign crude oil, particularly in Canada.

The small gain in the domestic demand for oil products in 1954 reflected the lowest annual gain in gasoline demand since 1946, a substantial increase in heating-oil requirements because of relatively colder weather than in 1953, and a sharp drop in the demand for heavy industrial fuels. The changes in domestic demand by products in 1954, compared with 1953, show a gain of only 2.7 percent for gasoline, a decrease of 6.8 percent for residual fuel, and increases of 7.8 percent for distillate fuel oil, 3.3 percent for kerosine, and 4.4 percent for other products.

The domestic demand for oil products was affected by the 3-percent increase in the marketed production of natural gas in 1954. Natural gas sold for industrial uses increased 1 percent and for residential and commercial uses 15 percent.

The peak of the industrial and military demand for oil, resulting from the Korean hostilities, has passed. Aviation gasoline, jet fuel, distillate fuel, and residual fuel oil delivered to the armed forces in continental United States fell to 113.0 million barrels in 1954. No data were collected for military deliveries of motor gasoline or other products.

The new supply of refined products comprises the refinery output from crude oil, the recovery of light oils from natural gas, a small amount of motor benzol, and the imports of products. The quantity of crude oil refined (runs to stills) declined 0.6 percent in 1954, whereas the production of light oils increased 4.0 percent, and the import of products increased 2.4 percent.

Total stocks of refined products increased only 1.9 million barrels in 1954 compared with an abnormal increase of 46.6 million barrels in 1953. These figures indicate that crude runs were considerably above requirements in 1953 and approximated current requirements in 1954.

The yields of the various products from crude oil indicate the trend in demand for products over a number of years. The yield of gasoline

TABLE 41.—Input and output of petroleum products at refineries in the United States, 1950–54

(Thousand barrels)

	1950	1951	1952	1952[1]	1953	1954[2]
Input:						
Crude petroleum:						
Domestic	1,918,854	2,188,677	2,235,198	2,235,198	2,321,820	2,300,766
Foreign	176,013	181,727	206,061	206,061	233,045	238,798
Total crude petroleum	2,094,867	2,370,404	2,441,259	2,441,259	2,554,865	2,539,564
Natural-gas liquids	94,639	99,250	103,898	103,898	111,293	117,549
Total input	2,189,506	2,469,654	2,545,157	2,545,157	2,666,158	2,657,113
Output:						
Gasoline	998,093	1,108,880	1,155,916	[3] 1,141,467	1,233,954	1,232,989
Kerosine	118,512	135,742	132,300	128,767	123,200	122,305
Distillate fuel oil	398,912	475,801	520,378	517,920	528,111	542,278
Residual fuel oil	425,217	469,377	453,897	453,897	449,979	416,757
Jet fuel	(4)	(4)	(4)	20,929	35,747	46,550
Lubricants	51,735	61,489	55,600	55,600	52,545	53,243
Wax[5]	4,462	4,814	4,331	4,331	4,978	5,290
Coke[5]	17,224	18,977	18,123	18,123	21,607	24,284
Asphalt[5]	58,240	66,302	70,312	70,312	72,409	74,912
Road oil	6,928	6,100	6,998	6,998	6,594	7,213
Still gas[5]	83,743	96,294	95,275	95,275	102,243	102,552
Liquefied gases	29,083	33,045	30,968	30,968	33,306	34,169
Other finished products	4,717	7,201	7,258	7,258	9,091	11,013
Unfinished gasoline (net)	243	[6] 353	489	(3)	(3)	(3)
Other unfinished oils (net)	[6] 6,891	[6] 11,367	[6] 4,136	[6] 4,136	[6] 422	[6] 7,974
Shortage[7]	(712)	(2,648)	(2,552)	(2,552)	(7,184)	(8,468)
Total output	2,189,506	2,469,654	2,545,157	2,545,157	2,666,158	2,657,113

[1] On 1953 basis, separating jet fuel from its components.
[2] Preliminary figures.
[3] New basis, including unfinished gasoline.
[4] Jet fuel is included in gasoline, kerosine and distillate fuel totals.
[5] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton; 3,600 cubic feet of still gas to the barrel.
[6] Negative quantity; represents net excess of unfinished oils rerun over unfinished oils produced.
[7] Includes losses or gains in volume during processing.

TABLE 42.—Percentage yields of refined petroleum products in the United States, 1945–54

Product	1945	1946	1947	1948	1948[1]	1949	1950	1951	1952	1952[2]	1953	1954[3]
Finished products:												
Gasoline	40.9	39.6	40.2	40.3	40.1	43.7	43.0	42.4	43.0	42.4	43.9	43.8
Kerosine	4.7	6.0	6.0	6.0	6.0	5.2	5.6	5.7	5.4	5.3	4.8	4.8
Distillate fuel oil	14.5	16.6	16.8	18.7	18.5	17.5	19.0	20.0	21.3	21.2	20.7	21.3
Residual fuel oil	27.3	24.9	24.1	23.0	23.5	21.7	20.2	19.7	18.5	18.5	17.6	16.4
Jet fuel	------	------	------	------	------	------	------	------	(4)	.8	1.4	1.8
Lubricating oil	2.4	2.7	2.8	2.5	2.5	2.3	2.5	2.6	2.3	2.3	2.1	2.1
Wax	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Coke	.6	.6	.7	.7	.7	.9	.8	.8	.7	.7	.8	1.0
Asphalt	2.3	2.6	2.7	2.6	2.5	2.5	2.8	2.8	2.9	2.9	2.8	2.9
Road oil	.2	.4	.4	.4	.4	.4	.3	.3	.3	.3	.3	.3
Still gas	6.0	5.1	4.6	4.0	4.0	4.2	4.0	4.1	3.9	3.9	4.0	4.0
Liquefied gases	1.1	1.3	1.3	1.5	1.5	1.4	1.6	1.7	1.3	1.3	1.3	1.3
Other finished products									.3	.3	.4	.4
Unfinished products (net):												
Gasoline	[5].3	([5, 6])	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
Other	[5].3	[5].1	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
Shortage	.4	.1	.2	.1	.1	------	------	(.3)	(.1)	(.1)	(.3)	(.3)
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Yields computed on the 1943 basis for California to compare with succeeding years.
[2] Yields computed on the 1953 basis to show jet fuel separately.
[3] Preliminary figures.
[4] Included in statistics of gasoline, kerosine, and distillate fuel oil.
[5] Negative percentage; represents excess rerun over produced.
[6] Less than 0.1 percent.
[7] Added to finished gasoline production in computing yields after 1946.
[8] Added to crude in computing yields after 1946.
[9] Included in gasoline.

(naphtha included) decreased from 43.9 percent in 1953 to 43.8 percent in 1954 and was related to a moderate increase in gasoline demand as well as a decrease in gasoline stocks in 1954 compared with a large gain in 1953. The gain in distillate fuel yield, from 20.7 percent to 21.3 percent, reflected the substantial gain in demand because of colder weather and the gain in heating oil requirements. The sharp decline in residual yields reflects the decline in residual demand combined with the increase in residual imports.

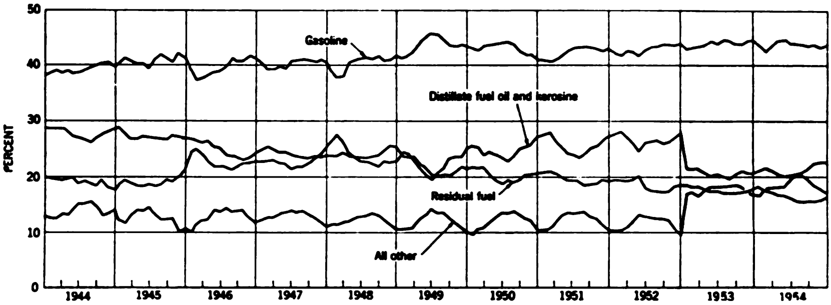

FIGURE 6.—Yields of principal products from crude runs to stills in the United States, 1945–54, by months.

The light oils from natural gas, including a small amount of coke-oven benzol blended with gasoline at refineries, contributed to the supply of other finished products. In 1954 about 63 percent of the total was used for gasoline blending or export; about 35 percent was used as liquefied gases for fuel or chemical uses, to supplement the similar output derived from still gas at refineries; and the remaining 2 percent represented distillate fuel oil and kerosine, added to the refinery output of those products by transfer as unfinished oils.

The total imports of products amounted to 144 million barrels in 1954, a gain of 2.4 percent. About 89 percent of the total was residual fuel oil coming from the Caribbean refineries to the East Coast district, where it is used for bunkering ships and as fuel for large electric and industrial plants on the seaboard. In 1954 total product imports into continental United States exceeded product exports by about 28 million barrels.

The monthly average wholesale price index for petroleum and petroleum products, compiled by the Bureau of Labor Statistics, declined from 112.7 in 1953 to 110.8 in 1954. The average value of crude oil at the well increased, but product prices in general were reduced although considerable variation by products and specified markets was shown. The average price of Regular Grade gasoline at Oklahoma refineries declined from 11.02 cents per gallon in 1953 to 10.96 cents in 1954. The tank-wagon price of kerosine at Chicago rose from 16.06 cents per gallon to 16.30 cents. The price of a selected bright stock at Oklahoma refineries declined from 20.84 cents per gallon to 17.79 cents. Bunker "C" oil at New York Harbor rose from $2.16 per barrel in 1953 to $2.24, and No. 2 distillate heating oil at New York declined from 9.68 cents per gallon to 9.51 cents in 1954.

TABLE 43.—Stocks of refined petroleum products in continental United States at end of month, 1953–54

(Thousand barrels)

Product	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
1953												
Gasoline [1]	149, 297	156, 659	161, 346	156, 824	154, 790	144, 882	142, 068	144, 238	141, 902	142, 419	148, 589	157, 872
Kerosine	23, 166	20, 209	18, 325	19, 919	23, 728	27, 155	30, 721	35, 131	36, 776	37, 690	35, 655	28, 684
Distillate fuel oil	80, 448	66, 740	59, 492	61, 122	73, 414	84, 007	102, 168	119, 220	126, 361	135, 255	133, 061	111, 741
Residual fuel oil	45, 910	44, 178	41, 600	39, 572	41, 795	43, 801	47, 966	50, 007	50, 516	50, 820	51, 267	49, 370
Jet fuel	1, 749	1, 900	2, 067	1, 851	2, 496	2, 315	2, 496	2, 714	3, 134	2, 701	3, 094	2, 666
Lubricating oil	11, 250	11, 224	11, 134	10, 801	10, 873	10, 611	9, 879	9, 684	9, 700	9, 726	9, 846	10, 070
Wax	573	537	530	503	510	506	503	524	510	530	558	538
Coke	555	649	700	769	948	775	705	769	781	603	686	860
Asphalt	7, 525	8, 687	9, 732	10, 473	10, 834	9, 586	8, 429	7, 094	5, 709	5, 541	6, 244	7, 314
Road oil	497	534	637	754	897	872	666	609	508	406	395	437
LR-gases	630	580	640	714	881	820	771	825	752	804	930	792
Miscellaneous	928	941	988	1, 018	1, 101	1, 024	883	917	861	915	901	1, 001
Other unfinished oils	62, 510	62, 670	67, 331	67, 352	72, 399	72, 608	71, 016	70, 166	69, 623	68, 784	69, 385	69, 289
Total 1953	385, 038	375, 508	374, 522	371, 672	394, 666	398, 962	418, 271	441, 898	447, 133	456, 194	460, 611	440. 634
1954												
Gasoline [1]	171, 704	179, 950	181, 297	177, 006	177, 606	165, 404	158, 010	153, 168	150, 916	149, 661	150, 604	155, 400
Kerosine	22, 013	20, 183	17, 533	19, 656	23, 892	28, 184	31, 953	34, 949	37, 099	37, 140	34, 547	27, 826
Distillate fuel oil	81, 044	70, 390	60, 270	61, 721	73, 581	86, 325	101, 657	116, 529	128, 061	139, 128	133, 886	108, 144
Residual fuel oil	47, 474	47, 119	44, 249	44, 362	47, 009	50, 216	54, 365	56, 332	56, 702	56, 541	54, 891	52, 105
Jet fuel	2, 839	2, 611	2, 777	2, 861	2, 927	2, 848	3, 016	3, 040	3, 356	2, 920	3, 052	3, 215
Lubricating oil	10, 472	10, 646	10, 385	9, 745	9, 764	9, 599	9, 251	9, 035	9, 230	9, 183	9, 475	9, 702
Wax	598	619	644	612	663	609	597	571	567	572	589	562
Coke	1, 046	1, 111	1, 346	1, 494	1, 657	1, 774	1, 918	1, 973	2, 009	2, 118	1, 974	2, 107
Asphalt	8, 370	9, 589	10, 970	11, 530	11, 383	9, 579	8, 542	7, 150	5, 912	5, 702	6, 165	7, 175
Road oil	541	652	769	895	984	894	744	725	592	527	470	434
LR-gases	779	832	893	849	952	1, 093	1, 091	1, 184	1, 153	1, 161	1, 164	941
Miscellaneous	1, 061	1, 233	1, 284	1, 180	1, 219	1, 265	1, 318	1, 304	1, 297	1, 205	1, 154	1, 236
Other unfinished oils	70, 228	69, 904	73, 871	76, 865	82, 751	83, 314	82, 330	79, 665	77, 191	76, 238	74, 147	73, 663
Total 1954	418, 169	414, 839	406, 288	408, 776	434, 388	441, 104	454, 792	465, 625	474, 085	482, 096	472, 118	442, 510

[1] Includes unfinished gasoline.

TABLE 44.—Input and output of petroleum products at refineries in the United States, 1953–54, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Input:													
Crude petroleum	218,288	195,133	217,073	203,425	217,074	212,433	220,197	222,048	210,686	213,017	209,599	215,892	2,554,865
Natural gas liquids	9,292	8,378	8,930	8,088	8,255	8,948	9,511	9,502	9,991	10,380	10,145	9,873	111,293
Total input	227,580	203,511	226,003	211,513	225,329	221,381	229,708	231,550	220,677	223,397	219,744	225,765	2,666,158
Output:													
Gasoline [1]	103,361	93,020	101,336	96,721	102,202	102,295	108,541	109,041	102,950	104,127	103,315	107,045	1,233,954
Kerosine	13,133	10,898	10,709	10,213	9,409	9,201	9,358	9,239	9,286	10,499	10,025	11,230	123,200
Distillate fuel oil	47,132	41,721	45,840	42,433	43,005	43,211	44,439	44,190	43,076	45,149	43,520	44,395	528,111
Residual fuel oil	40,515	35,704	38,931	36,572	37,120	37,151	37,942	37,894	36,098	36,716	36,684	38,652	449,979
Jet fuel	2,088	2,426	2,300	2,635	3,255	2,947	3,363	3,344	3,653	3,109	3,532	3,095	35,747
Lubricating oil	4,210	3,596	4,321	4,271	4,572	4,293	4,321	4,627	4,562	4,647	4,553	4,572	52,545
Wax [2]	378	356	435	424	439	441	398	397	420	436	434	420	4,978
Coke [2]	1,683	1,622	1,668	1,707	1,850	1,752	1,869	1,920	1,885	1,821	1,900	1,930	21,607
Asphalt [2]	3,890	3,921	4,689	5,330	6,451	7,680	8,243	8,366	7,689	7,081	5,181	3,888	72,409
Road oil	190	175	243	333	588	990	1,171	1,215	820	410	256	203	6,594
Still gas [2]	8,109	7,348	8,210	8,325	9,004	9,095	9,529	9,453	8,766	8,337	8,080	7,987	102,243
LR-gases	3,062	2,738	2,775	2,770	2,795	2,625	2,750	2,958	2,602	2,636	2,784	2,811	33,306
Other miscellaneous	709	722	814	808	902	675	710	779	735	745	730	762	9,091
Other unfinished oils (net)	[3] 283	[3] 341	3,965	[3] 528	4,444	[3] 298	[3] 2,095	[3] 1,435	[3] 1,139	[3] 1,490	[3] 301	[3] 921	[3] 422
Shortage or overage	(597)	(395)	(233)	(501)	(707)	(677)	(831)	(438)	(726)	(826)	(949)	(304)	(7,184)
Total output	227,580	203,511	226,003	211,513	225,329	221,381	229,708	231,550	220,677	223,397	219,744	225,765	2,666,158
1954 [4]													
Input:													
Crude petroleum	215,366	197,914	214,620	204,336	218,178	208,408	214,402	212,708	208,155	211,851	209,244	224,382	2,539,564
Natural gas liquids	9,633	8,987	9,240	8,861	9,441	9,423	9,828	10,334	10,487	10,612	10,604	10,099	117,549
Total input	224,999	206,901	223,860	213,197	227,619	217,831	224,230	223,042	218,642	222,463	219,848	234,481	2,657,113
Output:													
Gasoline [1]	103,969	94,231	101,091	98,935	104,682	101,379	104,920	105,132	102,613	104,207	102,853	108,977	1,232,989
Kerosine	12,086	11,542	10,943	9,665	9,350	9,177	9,156	9,357	9,018	9,596	10,619	11,796	122,305
Distillate fuel oil	45,474	43,256	45,204	41,218	42,531	41,966	43,892	45,048	45,415	47,890	48,666	51,718	542,278
Residual fuel oil	39,398	34,754	36,222	34,215	35,582	33,691	33,749	33,131	32,569	33,047	33,593	36,806	416,757
Jet fuel	2,956	3,237	3,897	3,229	3,424	4,158	4,332	4,662	4,633	4,008	4,208	3,806	46,550
Lubricating oil	4,408	4,221	4,376	4,204	4,566	4,508	4,386	4,563	4,522	4,475	4,470	4,544	53,243
Wax [2]	442	420	478	434	474	409	433	408	453	450	485	404	5,290
Coke [2]	1,936	1,623	1,975	1,929	1,897	1,857	2,102	2,061	2,049	2,282	2,220	2,353	24,284
Asphalt [2]	3,447	3,956	4,895	5,392	6,888	7,775	8,850	8,726	7,999	7,413	5,371	4,200	74,912
Road oil	221	259	260	417	658	980	1,364	1,342	845	479	253	135	7,213
Still gas [2]	7,985	7,545	8,359	8,653	9,096	9,093	9,771	9,464	8,644	8,000	7,778	8,164	102,552
LR-gases	2,823	2,848	3,241	2,681	2,792	2,804	2,850	2,730	2,676	2,500	2,911	3,313	34,169
Other miscellaneous	864	820	894	965	1,001	987	1,003	889	1,011	783	870	926	11,013
Other unfinished oils (net)	[3] 149	[3] 1,284	2,839	2,009	5,038	[3] 578	[3] 2,081	[3] 3,617	[3] 3,261	[3] 2,000	[3] 3,231	[3] 1,659	[3] 7,974
Shortage or overage	(861)	(527)	(814)	(749)	(360)	(375)	(497)	(854)	(544)	(667)	(1,218)	(1,002)	(8,468)
Total output	224,999	206,901	223,860	213,197	227,619	217,831	224,230	223,042	218,642	222,463	219,848	234,481	2,657,113

[1] Includes unfinished gasoline (net).

[2] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton; 3,600 cubic feet of still gas to the barrel.

[3] Negative quantity; represents net excess of unfinished oils rerun over unfinished oils produced.

[4] Preliminary figures.

TABLE 45.—Input and output of petroleum products at refineries in the United States, 1953–54, by districts

(Thousand barrels)

	East Coast	Appalachian	Indiana, Illinois, Kentucky, etc.	Oklahoma, Kansas, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas-Louisiana	Rocky Mountain	California	Total
1953											
Input:											
Crude petroleum	381, 340	72, 298	466, 100	214, 978	93, 400	619, 872	200, 910	31, 238	92, 775	381, 954	2, 554, 865
Natural gas liquids	3, 621	109	12, 891	10, 596	16, 582	30, 710	5, 429	1, 165	2, 591	27, 599	111, 293
Total input	384, 961	72, 407	478, 991	225, 574	109, 982	650, 582	206, 339	32, 403	95, 366	409, 553	2, 666, 158
Output:											
Gasoline [1]	154, 989	33, 610	249, 861	123, 183	64, 589	287, 543	98, 739	12, 425	46, 089	162, 926	1, 233, 954
Kerosine	13, 856	4, 208	28, 665	5, 264	4, 049	42, 993	17, 937	2, 788	1, 380	2, 060	123, 200
Distillate fuel oil	91, 647	12, 102	80, 955	49, 005	15, 687	145, 650	50, 351	7, 083	19, 810	55, 821	528, 111
Residual fuel oil	84, 650	9, 931	63, 244	18, 774	12, 243	88, 874	18, 677	2, 514	16, 288	134, 784	449, 979
Jet fuel	1, 422	413	3, 672	2, 641	1, 206	17, 721	3, 152	176	332	5, 012	35, 747
Lubricating oil	9, 424	4, 872	4, 917	3, 564	145	17, 941	4, 939	1, 930	199	4, 614	52, 545
Wax [2]	1, 641	415	218	472	94	1, 029	698	----	69	342	4, 978
Coke [2]	1, 515	285	9, 267	2, 508	339	1, 788	1, 681	874	1, 165	2, 185	21, 607
Asphalt [2]	16, 800	2, 764	12, 103	8, 031	4, 198	5, 677	4, 077	3, 649	3, 854	11, 256	72, 409
Road oil	40	5	1, 278	1, 063	43	9	2	1	1, 609	2, 544	6, 594
Still gas [2]	13, 057	4, 204	22, 753	6, 887	4, 848	26, 133	5, 729	1, 115	3, 648	13, 869	102, 243
LR-gases	4, 996	183	3, 872	2, 141	1, 489	8, 362	6, 545	542	348	4, 828	33, 306
Other miscellaneous	665	256	1, 115	579	1, 678	823	1, 257	755	37	1, 926	9, 091
Other unfinished oils (net)	[3] 9, 841	[3] 566	441	999	[3] 2, 334	6, 817	[3] 3, 776	[3] 1, 329	89	9, 078	[3] 422
Shortage	100	(275)	(3, 370)	463	1, 708	(778)	(3, 669)	(120)	449	(1, 692)	(7, 184)
Total output	384, 961	72, 407	478, 991	225, 574	109, 982	650, 582	206, 339	32, 403	95, 366	409, 553	2, 666, 158
1954 [4]											
Input:											
Crude petroleum	375, 845	68, 018	465, 640	219, 322	86, 974	616, 458	208, 986	32, 045	93, 802	372, 474	2, 539, 564
Natural gas liquids	4, 340	225	12, 842	11, 869	19, 673	29, 538	6, 665	900	2, 659	28, 838	117, 549
Total input	380, 185	68, 243	478, 482	231, 191	106, 647	645, 996	215, 651	32, 945	96, 461	401, 312	2, 657, 113
Output:											
Gasoline [1]	154, 979	32, 353	246, 673	125, 760	63, 163	290, 154	101, 951	12, 894	46, 204	158, 858	1, 232, 989
Kerosine	11, 845	3, 713	26, 958	5, 961	3, 658	43, 234	20, 588	2, 863	1, 558	1, 927	122, 305
Distillate fuel oil	93, 444	12, 966	88, 837	51, 027	15, 462	143, 807	54, 761	7, 575	21, 192	53, 207	542, 278
Residual fuel oil	76, 965	7, 158	59, 948	15, 357	9, 105	82, 641	15, 607	2, 471	14, 440	133, 065	416, 757
Jet fuel	2, 086	595	3, 806	4, 592	2, 331	16, 681	4, 476	516	961	10, 506	46, 550
Lubricating oil	8, 480	4, 314	4, 658	3, 849	144	19, 373	5, 401	1, 804	220	5, 000	53, 243
Wax [2]	1, 684	376	205	557	167	1, 065	729	----	76	431	5, 290
Coke [2]	1, 491	301	9, 947	3, 292	644	2, 270	1, 882	820	1, 073	2, 564	24, 284
Asphalt [2]	17, 803	3, 005	13, 048	8, 535	3, 830	5, 465	4, 379	3, 962	4, 548	10, 337	74, 912
Road oil	124	32	1, 393	982	27	11	2	2	1, 774	2, 866	7, 213
Still gas [2]	12, 694	3, 679	21, 891	7, 313	4, 647	26, 425	6, 251	1, 402	3, 547	14, 703	102, 552
LR-gases	4, 516	220	3, 528	2, 867	1, 445	8, 752	6, 873	366	475	5, 127	34, 169
Other miscellaneous	1, 288	252	1, 198	655	1, 742	1, 355	1, 341	1, 053	89	2, 040	11, 013
Other unfinished oils (net)	[3] 6, 362	[3] 482	400	[3] 177	[3] 1, 854	5, 505	[3] 4, 128	[3] 2, 552	[3] 5	1, 681	[3] 7, 974
Shortage	(852)	(239)	(4, 008)	621	2, 136	(742)	(4, 462)	(231)	309	(1, 000)	(8, 468)
Total output	380, 185	68, 243	478, 482	231, 191	106, 647	645, 996	215, 651	32, 945	96, 461	401, 312	2, 657, 113

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[1] Includes unfinished gasoline (net). [2] Conversion factor: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton, 3,600 cubic feet of still gas to the barrel. [3] Negative quantity; represents net excess of unfinished oils rerun over unfinished oils produced. [4] Preliminary figures.

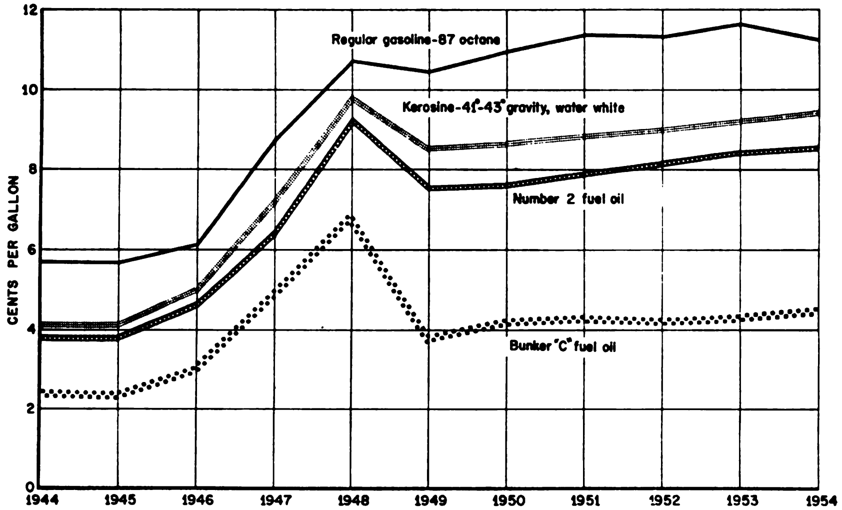

FIGURE 7.—Prices of Bunker "C" oil at New York Harbor, bright stock at Oklahoma refineries, tank-wagon prices of kerosine at Chicago, and Regular Grade gasoline at refineries in Oklahoma, 1944–54, by months.

REFINERY CAPACITY

The total crude-oil capacity of refineries in the United States on January 1, 1955, was 8,421,000 barrels daily—an increase of 414,000 barrels daily, or 5.2 percent over 1953. The expansion program, begun in 1951, has increased total capacity by 1,457,000 barrels daily, or 21 percent, since January 1, 1951. Since actual crude runs averaged 6,958,000 barrels daily in 1954, or about 85 percent of capacity, a slower rate of expansion is indicated for several years to come. Since 1951 the largest gains, by refinery districts, have been 37 percent for the Louisiana Gulf, 31 percent for the Oklahoma-Kansas, 23 percent for the East Coast, 23 percent for the Texas Gulf, 22 percent for the Rocky Mountain, and 19 percent for the Indiana-Illinois.

TABLE 46.—Petroleum-refinery capacity in the United States, Jan. 1, 1950–55

Year	Number of refineries				Capacity (barrels per day)			
	Operating	Shutdown	Total	Under construction	Operating	Shutdown	Total	Under construction
1950	320	47	367	2	6,222,998	473,302	6,696,300	145,600
1951	325	32	357	1	6,701,815	231,829	6,963,644	160,100
1952	327	23	350	----------	7,161,366	171,519	7,332,885	282,680
1953	315	28	343	4	7,481,701	[1] 156,960	7,638,661	509,721
1954	308	29	337	7	7,782,103	[1] 224,794	8,006,897	397,500
1955	296	30	326	4	8,069,154	[1] 351,476	8,420,630	146,800

[1] Includes 18,941 in 1953, 22,920 in 1954, and 34,586 in 1955 reported as inoperative without reconditioning.

AVIATION GASOLINE

The total demand for aviation grades of gasoline declined from 86.6 million barrels in 1953 to 84.1 million in 1954, a decrease of 2.8 percent. Exports increased 3.3 million barrels, while domestic demand decreased 5.8 million. Civilian deliveries increased 6.2 million barrels, whereas military deliveries declined 12.0 million barrels, chiefly because of the truce in Korea and the rapid increase in the use of jet fuels in military planes.

All data for aviation gasoline are included in total gasoline figures. "Transfers out" is rejected material returned to regular grades of gasoline. Gross production less "transfers out" equals net production used in computing demand.

GASOLINE

Although the total demand for gasoline set another new record in 1954, the 2.3-percent gain was the smallest annual increase since 1946. Exports declined 9.1 percent, and domestic demand in continental United States increased only 2.7 percent because of a smaller annual gain for highway use, a decline in the military demand for aviation gasoline, and the curtailment of commercial demand for naphthas. Data for gasoline include aviation gasoline and naphthas.

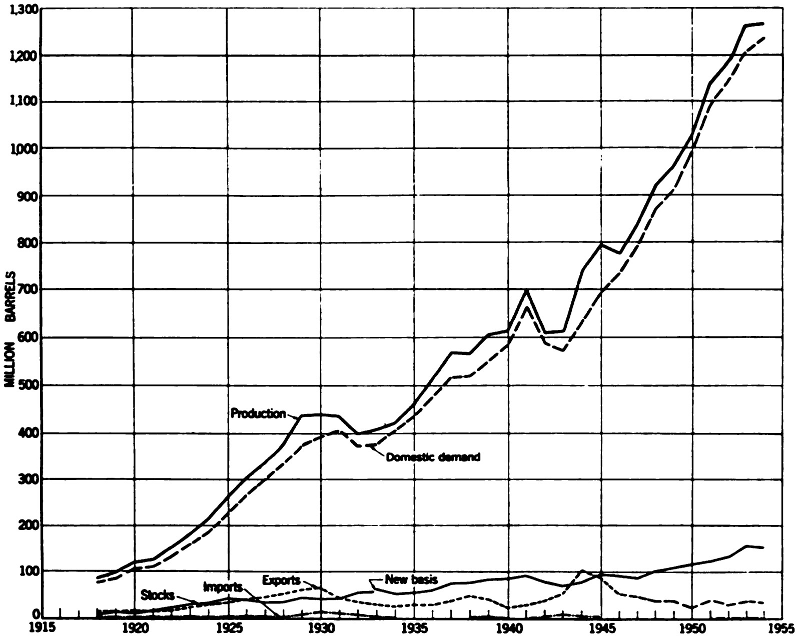

FIGURE 8.—Production, domestic demand, exports, imports, and stocks of gasoline in the United States, 1918–54.

TABLE 47.—Salient statistics of aviation gasoline in the United States, 1952 (total) and 1953, by months

(Thousand barrels)

	1953													1952
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Production:														
100-octane and above	5, 992	5, 815	5, 942	6, 065	6, 748	6, 830	6, 568	7, 013	6, 655	5, 994	6, 120	6, 230	75, 972	66, 773
Other grades	975	782	1, 399	1, 198	1, 159	981	1, 225	1, 140	1, 239	1, 343	954	1, 446	13, 841	13, 577
Transfers out [1]	153	92	276	96	225	191	163	227	92	168	405	240	2, 328	2, 350
Exports	1, 005	1, 368	1, 373	1, 552	1, 274	1, 343	1, 205	1, 473	1, 659	1, 103	1, 551	978	15, 884	14, 997
Stocks:														
100-octane and above	5, 241	4, 887	5, 168	4, 910	5, 348	4, 900	5, 253	5, 700	5, 640	5, 965	5, 856	5, 498	5, 498	4, 851
Other grades	4, 586	4, 538	4, 714	4, 691	4, 480	4, 263	4, 263	4, 241	4, 459	4, 713	4, 306	4, 674	4, 674	4, 432
Domestic demand: All grades	5, 265	5, 539	5, 235	5, 896	6, 181	6, 942	6, 072	6, 028	5, 985	5, 487	5, 634	6, 448	70, 712	61, 997
Total demand,[2] by grades:														
100-octane and above	5, 598	6, 173	5, 504	6, 315	6, 287	7, 278	6, 216	6, 537	6, 718	5, 655	6, 223	6, 591	75, 095	66, 284
Other finished	647	680	920	1, 020	1, 079	946	973	862	900	858	810	634	10, 329	9, 261
Components	25	54	184	113	89	61	88	102	26	77	152	201	1, 172	1, 449
Production by districts:														
100-octane and above:														
District 1	490	465	449	307	396	524	550	544	497	518	414	482	5, 636	6, 311
District 2	599	602	579	581	714	774	704	740	739	666	788	544	8, 030	6, 816
District 3	3, 680	3, 570	3, 468	4, 116	4, 249	3, 897	3, 893	4, 353	3, 967	3, 554	3, 712	3, 790	46, 249	39, 648
District 4	63	95	92	84	93	82	106	106	89	87	77	77	1, 051	785
District 5	1, 160	1, 083	1, 354	977	1, 296	1, 553	1, 315	1, 270	1, 363	1, 169	1, 129	1, 337	15, 006	13, 213
Total	5, 992	5, 815	5, 942	6, 065	6, 748	6, 830	6, 568	7, 013	6, 655	5, 994	6. 120	6, 230	75, 972	66, 773
Other grades:[1]														
District 1	50	−1	−62	54	105	−3	33	52	−50	36	−19	−19	176	169
District 2	337	70	443	238	155	147	150	253	152	246	156	527	2, 874	1, 740
District 3	330	563	976	645	587	687	830	606	902	891	558	833	8, 408	8, 991
District 4	29	5	7	23	32	−12	20	10	24	14	13	15	180	198
District 5	229	145	35	238	280	162	192	219	211	156	246	90	2, 203	2, 479
Total	975	782	1, 399	1, 198	1, 159	981	1, 225	1, 140	1, 239	1, 343	954	1, 446	13, 841	13, 577

Stocks, by districts, end of period:														
100-octane and above														
District 1	422	432	334	351	317	281	383	388	352	394	378	324	324	401
District 2	936	786	762	888	881	967	868	972	984	1,018	1,095	1,045	1,045	921
District 3	2,645	2,470	2,759	2,675	3,104	2,583	2,965	3,223	3,000	3,303	3,327	3,112	3,112	2,505
District 4	21	31	28	40	37	11	22	25	26	31	33	45	45	22
District 5	1,217	1,168	1,285	956	1,009	1,058	1,015	1,092	1,278	1,219	1,023	972	972	1,002
Total	5,241	4,887	5,168	4,910	5,348	4,900	5,253	5,700	5,640	5,965	5,856	5,498	5,498	4,851
Other grades:														
District 1	496	497	440	474	504	428	422	463	375	422	392	358	358	452
District 2	962	899	1,062	1,147	1,103	1,016	988	1,004	959	1,037	945	1,212	1,212	727
District 3	2,198	2,225	2,434	2,230	1,978	2,005	2,095	2,062	2,367	2,572	2,236	2,480	2,480	2,400
District 4	62	54	45	52	66	32	30	21	31	31	32	34	34	44
District 5	868	863	733	788	829	782	728	691	727	651	701	590	590	809
Total	4,586	4,538	4,714	4,691	4,480	4,263	4,263	4,241	4,459	4,713	4,306	4,674	4,674	4,432
Total demand,[2] by districts:														
District 1	475	453	542	297	501	633	487	545	569	461	439	549	5,951	6,416
District 2	675	882	841	605	883	882	976	823	923	794	941	818	10,043	8,276
District 3	4,018	4,266	3,772	5,042	4,565	5,007	4,207	4,681	4,763	3,896	4,295	4,470	52,982	46,837
District 4	75	98	111	87	114	128	117	122	102	96	87	78	1,215	972
District 5	1,027	1,208	1,342	1,417	1,392	1,635	1,490	1,330	1,287	1,343	1,423	1,511	16,405	14,493
Total	6,270	6,907	6,608	7,448	7,455	8,285	7,277	7,501	7,644	6,590	7,185	7,426	86,596	76,994

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[1] Reject material used as automotive gasoline.

[2] Includes exports.

[3] Includes 90- to 99-octane and net production of components. The negative production figures reported in some months by districts represent transfers of stocks of components outside the group.

Note: See table 59 for definition of districts.

TABLE 48.—Salient statistics of aviation gasoline in the United States in 1954, by months

(Thousand barrels)

	1954 [1]												
	January	February	March	April	May	June	July	August	September	October	November	December	Total
Production, by grades:													
115- to 145-octane	2,381	2,293	2,533	2,478	2,533	2,673	2,354	2,638	2,614	2,691	2,788	3,401	31,377
108- to 135-octane	236	122	200	244	285	268	279	476	298	279	378	241	3,306
100- to 130-octane	3,370	3,213	3,380	3,119	3,862	3,929	3,802	3,634	3,215	3,239	2,924	3,366	41,053
91- to 98-octane	568	455	519	574	318	484	573	476	504	662	522	512	6,167
Other grades	173	114	263	248	258	254	343	286	280	357	275	223	3,074
Alkylate	754	879	790	869	613	882	831	1,089	798	738	830	818	9,891
Transfers out [2]	672	858	823	751	656	1,203	901	900	893	977	942	994	10,570
Exports	1,767	1,320	908	1,156	1,659	2,325	1,557	1,644	1,599	1,788	1,669	1,796	19,188
Stocks, by grades:													
115- to 145-octane	2,277	1,988	2,122	1,996	2,220	1,468	1,743	1,917	2,162	2,456	2,151	1,796	1,796
108- to 135-octane	248	238	290	259	307	237	287	383	273	273	400	333	333
100- to 130-octane	2,884	2,968	3,038	3,181	4,073	3,537	3,453	3,499	3,406	3,322	3,179	3,440	3,440
91- to 98-octane	1,296	1,349	1,398	1,494	1,228	1,144	1,111	895	777	796	871	851	851
Other grades	391	379	383	371	370	355	413	380	395	366	387	399	399
Alkylate	2,501	2,603	2,668	2,840	2,721	2,527	2,565	2,888	2,783	2,663	2,518	2,399	2,399
Domestic demand	4,501	4,970	5,580	5,383	4,776	6,613	5,420	5,665	5,383	5,121	5,476	6,059	64,947
Total demand,[3] by grades:													
115- to 145-octane	2,015	2,528	2,404	2,460	2,263	3,359	2,106	2,481	2,383	2,420	3,083	3,773	31,275
108- to 135-octane	340	132	148	276	234	338	234	379	408	258	245	280	3,272
100- to 130-octane	3,344	3,077	3,211	2,974	2,966	4,418	3,748	3,538	3,281	3,281	3,027	3,071	39,936
91- to 98-octane	375	402	471	477	581	466	533	548	504	487	407	488	5,739
Other grades	172	119	253	258	259	272	280	317	260	383	250	207	3,030
Alkylate	22	32	1	94	182	85	76	46	146	80	133	36	883
Production, by districts:													
District 1	496	473	448	518	429	579	517	552	444	434	508	466	5,864
District 2	828	756	857	855	721	824	1,021	1,084	829	775	827	1,004	10,381
District 3	4,417	4,041	4,623	4,680	4,987	5,212	4,877	5,121	4,733	5,049	4,755	5,200	57,695
District 4	127	121	100	113	103	128	133	109	125	90	91	80	1,320
District 5	1,614	1,685	1,657	1,366	1,629	1,747	1,634	1,733	1,578	1,618	1,536	1,811	19,608
Total	7,482	7,076	7,685	7,532	7,869	8,490	8,182	8,599	7,709	7,966	7,717	8,561	94,868

Stocks, by districts:													
District 1	721	609	583	552	639	665	719	819	848	778	656	585	585
District 2	2,032	1,848	1,940	2,099	2,068	1,769	1,847	2,021	1,891	1,959	1,991	2,020	2,020
District 3	4,884	5,054	5,338	5,513	5,927	4,848	5,009	5,095	4,849	4,707	5,038	4,824	4,824
District 4	94	84	62	83	72	85	98	99	93	110	127	107	107
District 5	1,866	1,930	1,976	1,894	2,213	1,901	1,899	1,928	2,115	2,322	1,694	1,682	1,682
Total	9,597	9,525	9,899	10,141	10,919	9,268	9,572	9,962	9,796	9,876	9,506	9,218	9,218
Demand, by districts:													
District 1	355	566	429	492	293	504	417	430	396	487	521	533	5,423
District 2	584	671	571	496	588	889	727	699	722	621	670	778	8,016
District 3	4,043	8,592	4,034	4,147	4,312	5,652	4,289	4,575	4,587	4,520	3,889	4,904	52,544
District 4	113	110	120	88	107	104	97	104	100	51	59	60	1,113
District 5	1,173	1,351	1,334	1,316	1,135	1,789	1,447	1,501	1,177	1,230	2,006	1,580	17,039
Total	6,268	6,290	6,488	6,539	6,435	8,938	6,977	7,309	6,962	6,909	7,145	7,855	84,135

[1] Preliminary figures.

[2] Reject material used as automotive gasoline.

[3] Includes exports.

NOTE. See table 59 for definition of districts.

TABLE 49.—Salient statistics of gasoline in the United States, 1952 (total) and 1953, by months

(Thousand barrels)

	1953						
	January	February	March	April	May	June	July
Production:							
Finished gasoline and naphtha from crude oil	93,533	84,610	91,794	88,941	94,011	94,058	99,171
Unfinished gasoline (net)	536	32	612	−308	−64	−711	−141
Natural-gas liquids used at refineries	9,292	8,378	8,930	8,088	8,255	8,948	9,511
Sold to jobbers	2,501	2,188	2,993	2,930	2,820	2,930	3,038
Total production	105,862	95,208	104,329	99,651	105,022	105,225	111,579
Daily average	3,415	3,400	3,365	3,322	3,388	3,508	3,599
Imports	4	8	141	9	7	142	4
Exports	3,175	3,218	3,117	4,066	2,865	2,634	3,393
Daily average	102	115	101	136	92	88	109
Stocks, end of period:							
Finished gasoline	140,525	147,855	151,930	147,716	145,746	136,549	133,876
Unfinished gasoline	8,772	8,804	9,416	9,108	9,044	8,333	8,192
Total stocks	149,297	156,659	161,346	156,824	154,790	144,882	142,068
Domestic demand	88,131	84,636	96,666	100,116	104,198	112,641	111,004
Daily average	2,843	3,023	3,118	3,337	3,361	3,755	3,581

	1953						1952 (total)
	August	September	October	November	December	Total	
Production:							
Finished gasoline and naphtha from crude oil	99,653	93,045	93,642	92,992	96,627	1,122,077	1,037,080
Unfinished gasoline (net)	−114	−86	105	178	545	584	489
Natural-gas liquids used at refineries	9,502	9,991	10,380	10,145	9,873	111,293	103,898
Sold to jobbers	2,909	1,977	2,446	2,729	2,961	32,422	36,560
Total production	111,950	104,927	106,573	106,044	110,006	1,266,376	1,178,027
Daily average	3,611	3,498	3,438	3,535	3,549	3,470	3,219
Imports	2	2	3	135	2	459	1,761
Exports	3,004	3,625	2,628	3,134	3,066	37,925	36,285
Daily average	97	121	85	104	99	104	99
Stocks, end of period:							
Finished gasoline	136,160	133,910	134,322	140,314	149,052	149,052	126,501
Unfinished gasoline	8,078	7,992	8,097	8,275	8,820	8,820	8,236
Total stocks	144,238	141,902	142,419	148,589	157,872	157,872	134,737
Domestic demand	106,778	103,640	103,431	96,875	97,659	1,205,775	1,142,987
Daily average	3,444	3,455	3,336	3,229	3,150	3,303	3,123

TABLE 50.—Salient statistics of gasoline in the United States, 1953 (total) and 1954, by months

(Thousand barrels)

	1954						
	January	February	March	April	May	June	July
Production:							
Finished gasoline and naphtha from crude oil	94,984	85,673	91,357	89,606	95,000	92,024	95,005
Unfinished gasoline (net)	−648	−429	494	468	241	−68	87
Natural-gas liquids used at refineries	9,633	8,987	9,240	8,861	9,441	9,423	9,828
Sold to jobbers	2,404	3,099	3,521	3,185	3,270	3,102	2,973
Total production	106,373	97,330	104,612	102,120	107,952	104,481	107,893
Daily average	3,431	3,476	3,375	3,404	3,482	3,483	3,480
Imports	2	2	1	1	2	133	133
Exports	2,691	2,880	1,717	2,546	2,936	3,779	3,189
Daily average	87	103	55	85	95	126	103
Stocks, end of period:							
Finished gasoline	163,532	172,207	173,060	168,301	168,660	156,526	149,045
Unfinished gasoline	8,172	7,743	8,237	8,705	8,946	8,878	8,965
Total stocks	171,704	179,950	181,297	177,006	177,606	165,404	158,010
Domestic demand	89,852	86,206	101,549	103,866	104,418	113,037	112,231
Daily average	2,898	3,079	3,276	3,462	3,368	3,768	3,620

	1954						1953 (total)
	August	September	October	November	December	Total	
Production:							
Finished gasoline and naphtha from crude oil	95,210	92,200	93,459	92,423	98,598	1,115,539	1,122,077
Unfinished gasoline (net)	−412	−74	136	−174	280	−99	584
Natural-gas liquids used at refineries	10,334	10,487	10,612	10,604	10,099	117,549	111,293
Sold to jobbers	3,118	2,712	2,960	3,043	2,776	36,163	32,422
Total production	108,250	105,325	107,167	105,896	111,753	1,269,152	1,266,376
Daily average	3,492	3,511	3,457	3,530	3,605	3,477	3,470
Imports	4	15	530	198	164	1,185	459
Exports	2,873	2,886	3,345	2,758	2,863	34,463	37,925
Daily average	93	96	108	92	92	94	104
Stocks, end of period:							
Finished gasoline	144,615	142,437	141,046	142,163	146,679	146,679	149,052
Unfinished gasoline	8,553	8,479	8,615	8,441	8,721	8,721	8,820
Total stocks	153,168	150,916	149,661	150,604	155,400	155,400	157,872
Domestic demand	110,223	104,706	105,607	102,393	104,258	1,238,346	1,205,775
Daily average	3,556	3,490	3,407	3,413	3,363	3,393	3,303

Production.—The total production of gasoline in 1954 amounted to 1,269.1 million barrels. This included 1,115.4 million barrels produced from crude oil at a yield of 43.8 percent, 117.5 million barrels of other light oils blended at refineries, and 36.2 million barrels of other light oils blended outside refineries. Production was supplemented by importing 1.2 million barrels, and by withdrawing 2.5 million barrels from stocks of finished and unfinished gasoline. Thus the total demand for gasoline was 1,272.8 million barrels.

TABLE 51.—Production of gasoline in the United States in 1954, by districts and months[1]

(Thousand barrels)

District	January	February	March	April	May	June	July	August	September	October	November	December	Total
Gasoline from crude oil (including unfinished, net):													
East Coast	12,600	11,072	12,277	11,948	12,244	12,219	13,144	13,257	12,997	12,271	12,136	12,864	149,029
Appalachian	2,919	2,835	2,762	2,334	2,927	2,954	2,829	2,683	2,482	2,400	2,263	2,340	31,728
Indiana, Illinois, Kentucky, etc	19,810	18,322	19,333	18,513	19,178	19,162	20,366	19,240	18,302	18,958	18,562	20,569	230,315
Oklahoma, Kansas, etc	9,690	8,783	9,470	8,978	9,440	9,437	9,527	9,523	8,803	9,601	9,359	9,942	112,553
Texas Inland	3,832	3,519	3,566	3,688	3,836	3,533	3,516	3,306	3,583	3,604	3,469	3,583	43,035
Texas Gulf Coast	19,966	17,887	20,617	21,456	21,736	20,423	21,457	21,894	21,099	21,753	21,476	22,737	252,501
Louisiana Gulf Coast	7,483	6,822	6,915	7,152	7,989	7,280	7,385	7,967	8,341	8,170	8,412	8,692	92,608
Arkansas, Louisiana Inland, etc	1,052	924	1,046	860	1,029	983	968	945	936	929	1,037	1,017	11,726
Rocky Mountain	3,748	3,655	3,583	3,423	3,762	3,951	3,721	3,646	3,517	3,144	3,327	3,913	43,390
California and Washington	11,334	9,696	10,702	9,958	11,219	10,430	10,392	10,442	10,407	10,819	10,522	11,359	127,280
Total gasoline	92,434	83,515	90,271	88,310	93,360	90,372	93,305	92,903	90,467	91,649	90,563	97,016	1,094,165
Naphtha:													
East Coast	152	120	124	128	61	224	124	170	146	120	123	118	1,610
Appalachian	58	48	14	32	34	39	32	41	33	29	13	27	400
Indiana, Illinois, Kentucky, etc	278	203	290	293	313	299	304	316	299	318	275	328	3,516
Oklahoma, Kansas, etc	102	98	134	131	128	100	97	112	103	123	89	121	1,338
Texas Inland	41	34	54	28	42	40	28	26	34	37	37	54	455
Texas Gulf Coast	799	694	557	753	791	551	680	697	544	718	644	687	8,115
Louisiana Gulf Coast	186	206	267	176	215	205	225	213	245	208	285	247	2,678
Arkansas, Louisiana Inland, etc	15	16	25	23	15	21	21	27	27	27	27	24	268
Rocky Mountain	18	9	14	4	10	13	18	13	8	23	16	9	155
California and Washington	253	301	101	196	272	92	258	280	220	343	177	247	2,740
Total naphtha	1,902	1,729	1,580	1,764	1,881	1,584	1,787	1,895	1,659	1,946	1,686	1,862	21,275
Total gasoline and naphtha from crude	94,336	85,244	91,851	90,074	95,241	91,956	95,092	94,798	92,126	93,595	92,249	98,878	1,115,440
Percent yield of gasoline and naphtha[2]	43.8	42.8	43.4	44.5	44.7	44.0	43.9	43.8	43.6	43.8	43.4	43.7	43.8
Natural-gas liquids blended at refineries	9,633	8,987	9,240	8,861	9,441	9,423	9,828	10,334	10,487	10,612	10,604	10,099	117,549
Total refinery production:													
East Coast	13,165	11,542	12,731	12,475	12,798	12,879	13,672	13,847	13,423	12,705	12,529	13,213	154,979
Appalachian	2,990	2,894	2,780	2,369	2,967	2,999	2,865	2,760	2,546	2,463	2,323	2,397	32,353
Indiana, Illinois, Kentucky, etc	21,469	19,652	20,541	19,630	20,406	20,252	21,584	20,511	19,812	20,483	20,119	22,214	246,673
Oklahoma, Kansas, etc	10,694	9,693	10,393	9,940	10,378	10,517	10,619	10,732	10,034	10,969	10,579	11,212	125,760
Texas Inland	5,240	4,918	5,176	5,449	5,515	5,203	5,308	5,043	5,245	5,443	5,306	5,317	63,163
Texas Gulf Coast	23,219	20,760	23,582	24,398	24,984	23,399	24,502	25,301	24,317	25,078	24,720	25,894	290,154
Louisiana Gulf Coast	8,182	7,553	7,638	7,817	8,732	8,042	8,191	8,749	9,191	8,977	9,350	9,529	101,951
Arkansas, Louisiana Inland, etc	1,171	1,033	1,140	921	1,116	1,081	1,072	1,035	1,042	1,034	1,139	1,110	12,894
Rocky Mountain	3,987	3,853	3,814	3,571	3,957	4,150	3,958	3,901	3,792	3,440	3,591	4,190	46,204
California and Washington	13,852	12,333	13,296	12,365	13,829	12,857	13,149	13,253	13,211	13,615	13,197	13,901	158,858
Total 1954	103,969	94,231	101,091	98,935	104,682	101,379	104,920	105,132	102,613	104,207	102,853	108,977	1,232,989
Natural-gas liquids used in other gasoline blends[3]	2,404	3,099	3,521	3,185	3,270	3,102	2,973	3,118	2,712	2,960	3,043	2,776	36,163
Total gasoline production	106,373	97,330	104,612	102,120	107,952	104,481	107,893	108,250	105,325	107,167	105,896	111,753	1,269,152

[1] Preliminary figures.

[2] Based on crude runs to stills adjusted for net change in stocks of unfinished oils.

[3] This represents a net figure and includes exports.

Yields.—The average yield of gasoline and naphtha from crude oil decreased from 43.9 percent in 1953 to 43.8 percent in 1954, owing to a small decline in gasoline stocks in 1954 compared with a large gain in 1953; to an increase in the percentage of other light oils blended with gasoline at refineries; and to the greater relative increase in distillate-fuel demand than for gasoline.

Exports.—Gasoline exports declined from 37.9 million barrels in 1953 to 34.5 million in 1954, a drop of 3.4 million barrels, or 9.1 percent. Shipments to Territories and possessions remained at 8.0 million barrels. Reflecting the growth of aviation activity abroad, exports of aviation grades increased 3.3 million barrels to 19.2 million, whereas exports of motor gasoline, natural gasoline, and naphthas declined 6.7 million barrels. Exports of motor gasoline to West Europe have declined steadily with the expansion in refinery capacity there.

Domestic Demand.—The domestic demand for gasoline and naphthas amounted to 1,238.4 million barrels in 1954, a gain of only 2.7 percent over 1953. Totals for all uses are not available, but the demand for highway use increased 35.6 million barrels in 1954, aviation demand declined 5.8 million, demand for naphthas decreased 3.5 million, and demand for all other uses increased 6.3 million barrels.

Gasoline for civilian highway use increased 3.6 percent in 1954 (from 995.8 to 1031.4 million barrels) according to the Bureau of Public Roads, which computed use from State tax returns. These data do not include quantities of diesel fuel and fuels other than gasoline consumed that totaled 21.6 million barrels in 1953 and 24.9 million barrels in 1954. The Bureau of Mines estimated that gasoline for civilian highway use equaled 82.6 percent of the domestic demand in 1953 and 83.3 percent in 1954.

The domestic demand for aviation gasoline represented 5.2 percent of the total domestic demand for gasoline in 1954.

No adequate data were available for motor gas for military purposes, farm tractor and other agricultural uses, and industrial uses.

Production and Consumption by States.—Table 52, which shows gasoline production and consumption by States, provides an approximate basis on indicative areas of surplus production and deficit supply. The refinery production data were compiled by the Bureau of Mines and do not include the light oils recovered from natural gas that were blended with gasoline outside refineries. Data on consumption by States were compiled by the American Petroleum Institute and do not include commercial naphthas or off-shore military shipments. These omissions roughly offset each other.

District 1 (Atlantic Coast States and West Virginia) produced 171 million barrels of gasoline and consumed 397 million in 1954, a deficit of 226 million barrels. Receipts from district 3, including 195 million by boat and 33 million by pipeline, partly offset the deficit.

District 2 (including refinery districts Appalachian 2 (eastern Ohio), Indiana-Illinois, and Oklahoma-Kansas) produced 388 million barrels and consumed 441 million barrels, indicating a deficit of 53 million barrels. Pipeline movements of 31 million barrels from district 3 and 3 million from district 1 partly offset this deficit, although other important supplies came by rail or river barge from district 3.

District 3 (Texas, Louisiana, Arkansas, Mississippi, Alabama, and New Mexico) produced 472 million barrels and consumed 174 million, indicating a surplus of 298 million. Of the surplus, 195 million barrels went to the east coast by boat, and 67 million barrels went into pipe-

TABLE 52.—Production (refinery output) and consumption of gasoline in the United States, 1952–54, by States

(Thousand barrels)

State	1952		1953		1954[1]	
	Production[2]	Consumption[3]	Production[4]	Consumption[3]	Production[4]	Consumption[3]
Alabama	(5)	16,321	(5)	17,288	(5)	18,167
Arizona		7,485		7,652		7,778
Arkansas	9,329	10,672	9,847	11,025	10,693	11,530
California	[6] 153,015	106,836	[6] 162,926	116,061	[6] 158,858	125,151
Colorado	4,253	12,516	4,346	[7] 12,867	4,755	13,525
Connecticut		13,664		14,523		15,118
Delaware		2,793		3,034		3,088
District of Columbia		4,943		4,863		4,785
Florida		25,185		27,118		29,378
Georgia	[8] 8,580	22,075	[8] 8,112	23,163	[8] 8,709	24,348
Idaho	(9)	5,250	(9)	5,551	(9)	5,694
Illinois	[10] 91,720	58,219	[10] 97,666	60,595	[10] 98,400	62,731
Indiana	65,246	33,168	72,239	35,648	68,356	36,320
Iowa		23,959		24,482		25,354
Kansas	[11] 51,646	19,798	[11] 59,386	21,004	[11] 62,169	23,259
Kentucky	[12] 14,711	15,623	[12] 13,197	16,344	[12] 11,580	17,285
Louisiana	[5] 91,797	15,510	[5] 101,317	[7] 16,490	[5] 104,153	17,572
Maine		6,014		[7] 6,302		6,554
Maryland	(8)	15,351	(8)	16,142	(8)	16,885
Massachusetts	[13] 1,509	[7] 24,866	[13] 2,432	25,488	[13] 4,979	26,752
Michigan	16,929	50,704	16,942	[7] 52,936	16,140	53,928
Minnesota	(10)	23,904	(10)	24,866	(10)	26,001
Mississippi	(5)	11,873	(5)	12,403	(5)	12,955
Missouri	(11)	32,377	(11)	33,378	(11)	34,907
Montana	8,158	5,944	8,926	6,127	8,637	6,367
Nebraska	(11)	12,222	(11)	12,659	(11)	13,094
Nevada		2,284		2,519		2,677
New Hampshire		3,425		3,653		3,848
New Jersey	61,131	35,409	63,576	37,809	56,394	39,942
New Mexico	4,101	6,721	4,362	7,234	4,150	7,414
New York	12,111	70,035	12,471	74,631	13,927	78,392
North Carolina		25,825		27,251		27,369
North Dakota		6,647		6,936	(11)	7,075
Ohio	62,464	58,646	66,541	62,364	68,212	64,501
Oklahoma	60,868	18,891	63,797	19,328	63,591	19,637
Oregon		13,530		13,631		13,861
Pennsylvania	81,957	59,056	83,082	62,005	85,818	63,422
Rhode Island	(13)	4,494	(13)	4,789	(13)	5,175
South Carolina	(8)	13,834	(8)	14.010	(8)	14,058
South Dakota		7,059		7,353		7,693
Tennessee	(12)	19,767	(12)	20,920	(12)	21,954
Texas	328,134	93,663	352,132	109,848	353,317	106,245
Utah	11,226	5,696	13,077	6,132	12,963	6,385
Vermont		2,545		2,671		2,718
Virginia		23,746		24,933		25,256
Washington	(6)	18,081	(6)	18,943	(6)	19,232
West Virginia	2,124	9,704	2,202	9,934	1,490	10,253
Wisconsin	(10)	25,815	(10)	26,971	(10)	27,255
Wyoming	[9] 14,907	3,541	[9] 15,378	3,698	[9] 15,698	3,785
Total	1,155,916	[7] 1,105,686	1,233,954	[7] 1,175,572	1,232,989	1,216,673

[1] Preliminary figures.
[2] Includes 14,938,000 barrels of jet fuel.
[3] American Petroleum Institute.
[4] Excludes jet fuel.
[5] Alabama and Mississippi included with Louisiana.
[6] Washington included with California.
[7] Revised.
[8] Maryland and South Carolina included with Georgia.
[9] Idaho included with Wyoming.
[10] Minnesota and Wisconsin included with Illinois.
[11] Missouri, Nebraska, and North Dakota included with Kansas.
[12] Tennessee included with Kentucky.
[13] Rhode Island included with Massachusetts.

TABLE 53.—Transportation of petroleum products by pipeline in 1953–54, by months

[Thousand barrels]

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Turned into lines: [1]													
Gasoline	32,971	29,278	34,131	34,205	36,710	36,066	38,352	36,235	35,552	37,160	36,252	35,411	422,323
Kerosine	3,779	2,903	2,420	1,765	1,723	1,427	1,543	1,998	2,188	2,807	2,924	3,751	29,228
Distillate fuel oil	12,664	9,409	9,092	7,183	7,388	7,782	8,118	8,401	8,832	9,270	10,562	13,838	112,539
LP-gases	438	325	306	279	278	320	379	338	314	227	486	375	4,065
Delivered from lines: [1]													
Gasoline	30,232	27,789	33,236	35,329	36,959	37,025	37,199	37,394	35,696	36,911	35,895	35,421	419,086
Kerosine	3,730	3,120	2,622	1,854	1,445	1,143	1,349	1,608	1,771	2,814	3,107	3,863	28,426
Distillate fuel oil	14,249	11,377	9,850	7,744	6,294	6,520	6,631	6,997	7,798	9,340	10,701	15,082	112,583
LP-gases	386	306	242	298	261	280	230	254	285	229	390	441	3,602
Shortage (or overage): [2]													
Gasoline	1	47	58	56	47	75	122	116	107	80	11	88	808
Kerosine	81	51	42	38	46	41	36	31	41	53	49	78	587
Distillate fuel oil	(44)	7	(10)	(6)	(5)	----------	(6)	17	13	25	71	(44)	18
LP-gases	31	29	18	26	21	17	23	18	11	33	25	35	287
Stocks in lines and working tanks at end of month:													
Gasoline	17,366	18,808	19,645	18,465	18,169	17,135	18,166	16,891	16,640	16,809	17,155	17,057	17,057
Kerosine	1,660	1,392	1,148	1,021	1,253	1,496	1,654	2,013	2,389	2,329	2,097	1,907	1,907
Distillate fuel oil	7,735	5,760	5,012	4,457	5,556	6,818	8,311	9,698	10,719	10,624	10,414	9,214	9,214
LP-gases	237	227	273	228	224	247	373	439	457	422	493	392	392
1954 [3]													
Turned into lines: [1]													
Gasoline	35,490	32,929	39,062	39,770	40,996	41,633	43,516	41,175	42,889	42,973	42,634	42,395	485,462
Kerosine	4,223	3,519	2,649	2,209	1,343	1,749	1,552	1,860	2,836	3,426	4,125	5,198	34,689
Distillate fuel oil	15,644	13,021	10,570	9,817	8,238	8,423	8,399	9,890	10,693	12,478	13,400	17,852	138,425
LP-gases	424	389	388	322	343	237	424	349	521	672	839	798	5,706
Delivered from lines: [1]													
Gasoline	34,497	32,226	38,588	39,344	40,680	42,134	42,861	41,867	42,849	43,701	43,142	41,873	483,762
Kerosine	4,243	3,818	2,799	2,228	1,387	1,811	1,313	1,744	2,601	3,192	3,917	5,194	33,747
Distillate fuel oil	17,521	13,759	12,097	9,639	7,395	6,889	6,882	8,723	10,499	12,145	13,284	18.969	137,802
LP-gases	545	300	367	344	228	232	330	337	553	600	640	823	5,299
Shortage (or overage): [2]													
Gasoline	58	(31)	69	24	83	67	101	108	83	99	59	29	749
Kerosine	78	66	66	56	47	37	41	41	55	70	63	76	696
Distillate fuel oil	(30)	49	(10)	10	(15)	(4)	(1)	(7)	21	25	27	(9)	56
LP-gases	17	18	23	15	19	18	24	18	23	27	28	65	295
Stocks in lines and working tanks at end of month:													
Gasoline	17,992	18,726	19,131	19,533	19,766	19,198	19,752	18,952	18.909	18,082	17,515	18,008	18,008
Kerosine	1,809	1,444	1,228	1,153	1,062	1,463	1,661	1,736	1,916	2,080	2,225	2,153	2,153
Distillate fuel oil	7,367	6,580	5,063	5,231	6,089	7,627	9,145	10,319	10,492	10,800	10,889	9,781	9.781
LP-gases	254	325	323	286	382	369	439	433	378	423	594	504	504

[1] The quantities "Turned into lines" and "Delivered from lines" are on a net basis, eliminating intersystem transfers, and are not comparable with data published previous to 1949.

[2] Figures in parentheses represent overage.

[3] Preliminary figures.

lines (33 million to district 1, 31 million to district 2, and 3 million to district 4). The rest was shipped by rail and barge to district 2 or was exported.

District 4 (Rocky Mountain States, except New Mexico) produced 42 million barrels, received 30 million barrels from district 3, and consumed 36 million barrels. Pipeline deliveries to district 5 accounted for 4.5 million barrels; substantial rail shipments also were made to district 5.

District 5 (California, Oregon, Washington, Nevada, and Arizona) produced 159 million barrels and consumed 169 million. Most of the deficit came by pipeline and rail from District 4.

Methods of Distribution.—Product pipelines were originally constructed to provide less expensive transportation of gasoline from Oklahoma and Texas to inland markets in the upper Middle West. Subsequently, additional lines were extended westward to Colorado, eastward into the southern half of the East Coast area, and recently from Utah to the inland markets of the upper Pacific Coast States. During the war, a product line was built from Texas to the upper East Coast but was converted to a gasline after the war. Distillate fuel oil and kerosine are being transported through the product lines at a rapidly increasing rate, without serious mixture of products at the point of contact.

In 1954 the product lines delivered about 661 million barrels representing 73 percent gasoline, 21 percent distillate fuel, 5 percent kerosine, and 1 percent liquefied gases. The gasoline delivered totaled 419 million barrels in 1953 and 484 million in 1954. The major water-borne movement of gasoline was 189 million barrels in 1953 and 195 million in 1954 transported from the Gulf Coast to the East Coast. A much smaller quantity moves by barge up the Mississippi and Ohio Rivers.

Stocks.—Stocks of finished gasoline, as reported, include stocks held at refineries and bulk terminals and by pipelines but do not include stocks held by secondary distributors, consumers, or in military custody. There are definite normal seasonal variations in gasoline storage because of a summer peak and a winter low in demand. Stocks build up in winter, even with lower refinery yields, and are reduced sharply during the summer. This fluctuation stabilizes to some extent seasonal yields of gasoline from crude oil. Distillate fuel oil follows the reverse of this pattern, as demand is high in winter and low in summer.

Stocks of finished and unfinished gasoline declined 2.5 million barrels in 1954. Because stocks were at a relatively high level during the first half of the year and there was a smaller gain in demand than had been expected, low seasonal runs to stills followed in the third quarter, and a small seasonal increase of only 4.5 million barrels in gasoline stocks occurred in the last quarter.

Day's supply, represented by total finished and unfinished gasoline stocks on December 31 (relative to January demand), declined to 48.7 in 1954 (table 56).

Prices.—The average posted dealer tank-wagon price for Regular Grade gasoline (exclusive of dealers' margins and sales taxes) in 50 representative cities in the United States provides an index of wholesale gasoline prices. This average increased from 15.95 cents per

TABLE 54.—Transportation of petroleum products by pipelines between PAW districts in the United States in 1953–54, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
From district 1 to district 2:													
Gasoline	20	103	82	135	88	165	232	125	96	85	168	178	1, 477
Kerosine	-----	-----	-----	-----	-----	5	-----	10	-----	-----	-----	12	27
Distillate fuel oil	18	1	11	-----	-----	11	-----	22	11	13	-----	-----	87
From district 3 to district 1:													
Gasoline	2, 637	2, 398	2, 402	2, 479	2, 627	2, 516	2, 795	2, 537	2, 506	2, 558	2, 427	2, 650	30, 532
Kerosine	880	843	560	304	297	141	309	307	442	857	839	1, 038	6, 817
Distillate fuel oil	957	732	668	560	460	575	533	589	536	892	749	964	8, 215
From district 3 to district 2:													
Gasoline	2, 142	1, 824	2, 125	2, 416	2, 653	2, 730	3, 268	2, 932	2, 281	2, 463	2, 400	2, 387	29, 621
Kerosine	133	108	138	83	113	25	66	56	89	165	152	179	1, 307
Distillate fuel oil	798	728	681	267	261	368	301	470	188	452	501	803	5, 818
From district 3 to district 4:													
Gasoline	157	145	178	184	187	217	287	301	223	248	190	231	2, 548
Kerosine	18	18	15	5	14	9	4	-----	3	8	10	22	126
Distillate fuel oil	10	7	7	5	10	8	29	18	15	17	18	13	157
1954													
From district 1 to district 2:													
Gasoline	206	195	191	239	240	289	326	326	305	262	181	236	2, 996
Kerosine	3	-----	-----	4	-----	-----	-----	10	10	-----	-----	5	32
Distillate fuel oil	28	10	12	18	11	-----	-----	15	20	15	-----	35	164
From district 3 to district 1:													
Gasoline	2, 524	2, 230	2, 880	2, 740	2, 797	2, 793	3, 017	2, 916	2, 625	2, 905	3, 034	2, 512	32, 973
Kerosine	1, 081	1, 005	625	412	354	130	405	462	691	788	794	1, 238	7, 985
Distillate fuel oil	946	973	614	685	401	493	661	717	760	778	777	1, 073	8, 878
From district 3 to district 2:													
Gasoline	2, 037	2, 081	2. 619	2, 441	2, 910	3, 117	3, 271	2, 789	2, 508	2, 743	2, 702	2, 268	31, 486
Kerosine	156	141	72	49	39	62	44	43	51	154	118	171	1, 100
Distillate fuel oil	1, 104	662	589	609	298	479	616	247	668	465	466	1, 007	7, 210
From district 3 to district 4:													
Gasoline	189	199	230	253	239	295	282	296	275	279	240	244	3, 021
Kerosine	23	13	13	17	1	4	5	4	12	9	16	17	134
Distillate fuel oil	20	15	15	17	21	18	7	16	15	19	14	17	194
From district 4 to district 5.[1]													

[1] Not available.

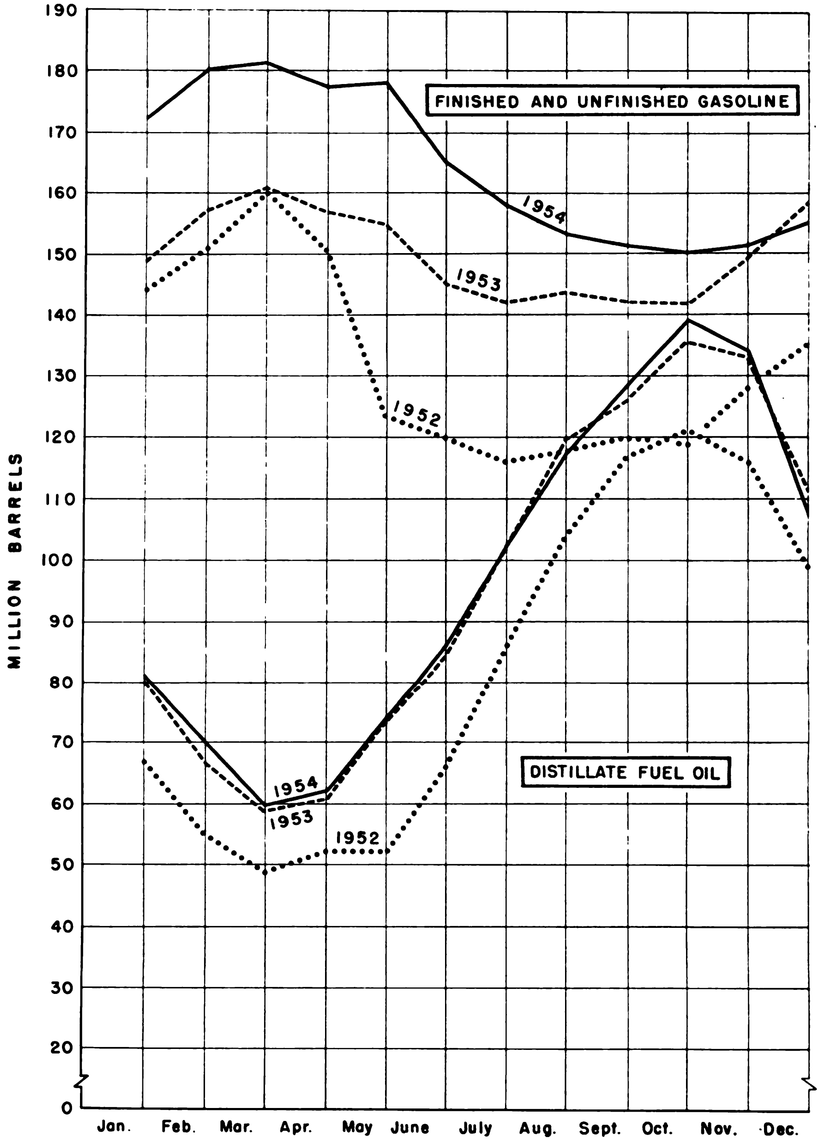

FIGURE 9.—Stocks of finished and unfinished gasoline and of distillate fuel oil in the United States, 1952–54, by months.

gallon in 1953 to 16.19 cents in 1954. The average service-station price (exclusive of sales taxes) increased from 21.28 cents per gallon to 21.56 cents, an increase in the dealers margin from 5.33 cents in 1953 to 5.37 cents in 1954. The average service-station price to the consumer (including local, State, and Federal taxes) rose from 28.69 cents to 29.04 cents. Total taxes rose from 7.41 cents in 1953 to 7.48 cents in 1954. The average local tax remained the same at 0.09 cent per gallon, the average State taxes rose from 5.32 cents to 5.39, and there was no change in the Federal tax of 2.00 cents.

TABLE 55.—Stocks of gasoline in the United States in 1954, by districts and months

(Thousand barrels)

District	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Finished gasoline: [1]												
East Coast	34, 560	34, 513	35, 931	35, 308	36, 177	35, 042	33, 628	33, 480	34, 034	33, 137	32, 920	30, 678
Appalachian	6, 249	6, 442	6, 769	6, 391	6, 865	6, 695	6, 466	6, 307	6, 184	6, 308	6, 624	6, 486
Indiana, Illinois, Kentucky, etc	35, 551	39, 252	40, 471	39, 161	38, 534	35, 982	34, 686	33, 553	32, 341	32, 309	30, 243	32, 686
Oklahoma, Kansas, etc	18, 910	19, 809	20, 394	19, 342	18, 679	17, 042	16, 145	15, 220	13, 929	13, 515	13, 964	14, 907
Texas Inland	6, 421	6, 714	6, 595	6, 841	7, 088	6, 101	5, 356	4, 905	5, 134	5, 187	5, 110	5, 517
Texas Gulf Coast	20, 148	21, 615	20, 016	19, 876	19, 889	16, 639	16, 234	16, 460	16, 070	16, 358	17, 926	19, 537
Louisiana Gulf Coast	9, 623	10, 003	9, 037	8, 517	8, 559	8, 231	7, 827	7, 894	8, 858	8, 776	10, 537	10, 506
Arkansas, Louisiana Inland, etc	4, 603	4, 500	4, 067	4, 104	4, 102	3, 710	4, 007	3, 676	3, 829	3, 695	3, 249	4, 110
Rocky Mountain	7, 105	8, 115	8, 435	8, 260	8, 329	7, 981	7, 181	6, 414	5, 653	5, 185	5, 591	6, 347
California	20, 362	21, 244	21, 345	20, 501	20, 438	19, 103	17, 515	16, 706	16, 405	16, 576	15, 999	15, 905
Total finished gasoline	163, 532	172, 207	173, 060	168, 301	168, 660	156, 526	149, 045	144, 615	142, 437	141, 046	142, 163	146, 679
Unfinished gasoline:												
East Coast	1, 103	1, 053	1, 170	1, 431	1, 431	1, 429	1, 180	1, 132	1, 281	1, 371	1, 257	1, 103
Appalachian	360	359	363	350	332	311	254	246	224	227	207	232
Indiana, Illinois, Kentucky, etc	921	745	804	746	832	862	964	1, 052	891	912	769	784
Oklahoma, Kansas, etc	132	179	248	270	227	216	210	171	150	157	142	175
Texas Inland	445	429	502	493	419	380	328	376	361	285	316	316
Texas Gulf Coast	3, 292	3, 070	3, 188	3, 278	3, 447	3, 309	3, 477	3, 160	3, 216	3, 299	3, 377	3, 334
Louisiana Gulf Coast	396	373	380	442	420	455	433	461	392	446	440	422
Arkansas, Louisiana Inland, etc	2	5	5	6	5	3	3	7	7	8	7	8
Rocky Mountain	130	151	150	164	129	153	191	222	227	144	116	144
California	1, 391	1, 379	1, 427	1, 525	1, 704	1, 760	1, 925	1, 726	1, 730	1, 766	1, 810	2, 203
Total unfinished gasoline	8, 172	7, 743	8, 237	8, 705	8, 946	8, 878	8, 965	8, 553	8, 479	8, 615	8, 441	8, 721
Total finished and unfinished gasoline:												
East Coast	35, 663	35, 566	37, 101	36, 739	37, 608	36, 471	34, 808	34, 612	35, 315	34, 508	34, 177	31, 781
Appalachian	6, 609	6, 801	7, 132	6, 741	7, 197	7, 006	6, 720	6, 553	6, 408	6, 535	6, 831	6, 718
Indiana, Illinois, Kentucky, etc	36, 472	39, 997	41, 275	39, 907	39, 366	36, 844	35, 650	34, 605	33, 232	33, 221	31, 012	33, 470
Oklahoma, Kansas, etc	19, 042	19, 988	20, 642	19, 612	18, 906	17, 258	16, 355	15, 391	14, 079	13, 672	14, 106	15, 082
Texas Inland	6, 866	7, 143	7, 097	7, 334	7, 507	6, 481	5, 684	5, 281	5, 495	5, 472	5, 426	5, 833
Texas Gulf Coast	23, 440	24, 685	23, 204	23, 154	23, 336	19, 948	19, 711	19, 620	19, 286	19, 657	21, 303	22, 871
Louisiana Gulf Coast	10, 019	10, 376	9, 417	8, 959	8, 979	8, 686	8, 260	8, 355	9, 250	9, 222	10, 977	10, 928
Arkansas, Louisiana Inland, etc	4, 605	4, 505	4, 072	4, 110	4, 107	3, 713	4, 010	3, 683	3, 836	3, 703	3, 256	4, 118
Rocky Mountain	7, 235	8, 266	8, 585	8, 424	8, 458	8, 134	7, 372	6, 636	5, 880	5, 329	5, 707	6, 491
California	21, 753	22, 623	22, 772	22, 026	22, 142	20, 863	19, 440	18, 432	18, 135	18, 342	17, 809	18, 108
Total 1954	171, 704	179, 950	181, 297	177, 006	177, 606	165, 404	158, 010	153, 168	150, 916	149, 661	150, 604	155, 400
1953	149, 297	156, 659	161, 346	156, 824	154, 790	144, 882	142, 068	144, 238	141, 902	142, 419	148, 589	157, 872

[1] Includes stocks of finished gasoline at refineries and bulk terminals, and in pipelines (excluding jet fuel).

TABLE 56.—Day's supply of gasoline on hand in the United States at end of month, 1952–54 [1]

	1952			1953			1954 [2]		
	Finished and unfinished[3]	Natural gasoline	Total gasoline	Finished and unfinished [3]	Natural gasoline	Total gasoline	Finished and unfinished [3]	Natural gasoline	Total gasoline
January	49.5	2.7	52.2	47.6	2.4	50.0	54.0	3.2	57.2
February	52.8	3.0	55.8	48.7	2.4	51.1	54.0	3.2	57.2
March	47.6	2.9	50.5	46.4	2.4	48.8	51.1	3.2	54.3
April	45.9	2.9	48.8	45.4	2.6	48.0	51.1	3.6	54.7
May	36.6	2.8	39.4	40.3	2.7	43.0	45.6	3.6	49.2
June	34.4	2.9	37.3	39.3	3.0	42.3	44.4	4.0	48.4
July	34.3	3.0	37.3	40.1	3.2	43.3	43.3	4.3	47.6
August	34.7	2.9	37.6	40.3	3.4	43.7	42.7	4.3	47.0
September	35.4	2.6	38.0	41.5	3.7	45.2	42.9	4.4	47.3
October	38.1	2.8	40.9	42.7	4.0	46.7	42.7	4.5	47.2
November	39.7	2.6	42.3	45.7	3.8	49.5	43.6	4.4	48.0
December	45.8	2.6	48.4	52.9	3.5	56.4	48.7	4.4	53.1

[1] Stocks divided by daily average total demand (domestic plus exports) for succeeding month.
[2] Preliminary figures.
[3] Excluding jet fuel.

KEROSINE

Total demand for kerosine increased only 1 percent in 1954, as a gain of 3 percent in domestic demand was partly offset by the sharp 33-percent decline in exports. Domestic demand accounted for 94 percent of the total demand in 1953 and 96 percent in 1954. Production of kerosine was about one percent less than in 1953; consequently a small quantity was withdrawn from storage in order to meet requirements.

The decline in production in 1954 was due entirely to a small decline in crude runs at refineries, as there was no change in the percentage yield.

As in 1953, about 84 percent of the kerosine was produced in 4 of the 10 refinery districts. Over a third of the total was credited to the Texas Gulf Coast area, and nearly a quarter to the Indiana-Illinois-Kentucky district. Approximately 15 percent and 10 percent, respectively, came from refineries operating in the Lousiana Gulf Coast and East Coast districts. The other refinery areas produced only relatively small quantities.

A 3-percent gain in the domestic demand for kerosine in 1954 was definitely due to the colder weather that prevailed at the time. There was a 5-percent increase in the first quarter because of the unusually cold weather in January and March. The average temperature in the second quarter of 1954, measured by degree-days, was well above that for the corresponding 1953 quarter; as a result, the domestic demand was off 7 percent. Colder weather from September through December 1954 increased demands over 5 percent in the final quarters of the year.

Exports of kerosine and shipments to noncontiguous Territories continued to decline in 1954 and were off 33 percent. Although exports to the United Kingdom increased slightly, shipments to other countries declined (Canada, 0.8 million barrels in 1953 to 0.6 in 1954; India, 2.7 million barrels in 1953 to 1.5 in 1954; and Egypt, 1.9 million barrels in 1953 to 0.6 in 1954).

TABLE 57.—Average monthly prices of gasoline in the United States, 1953–54, in cents per gallon

	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1953													
Monthly average at refineries in Oklahoma, regular, 82-octane [1]	10.50	10.50	10.50	10.50	10.50	10.93	11.50	11.50	11.50	11.50	11.47	11.36	11.02
Average of 50 cities on 1st of month: [2]													
Dealer's net (excluding tax)	15.22	15.24	15.43	15.44	15.45	15.44	16.55	16.59	16.56	16.54	16.53	16.46	15.95
Service station (including State, local, and Federal taxes)	27.63	27.64	27.97	28.12	27.93	28.03	29.51	29.61	29.48	29.47	29.25	29.57	38.69
1954													
Monthly average at refineries in Oklahoma, regular, 82-octane [1]	11.22	11.10	11.06	11.06	11.06	11.06	10.88	10.81	10.81	10.81	10.81	10.81	10.96
Average of 50 cities on 1st of month: [2]													
Dealer's net (excluding tax)	16.35	16.27	16.22	16.24	16.22	16.23	16.05	15.90	16.28	16.20	16.08	16.14	16.19
Service station (including State, local, and Federal taxes)	29.43	29.27	29.06	29.06	28.83	29.29	29.08	28.94	29.20	28.82	28.78	28.76	29.04

[1] National Petroleum News.
[2] American Petroleum Institute; compiled by the Texas Co.

Year-end stocks of kerosine declined 3 percent in 1954. Inventories in the East Coast area, where over 40 percent of the stocks is usually held, dropped 13 percent; and stocks in the Indiana-Illinois-Kentucky district, which usually represent about a quarter of the total, dropped 3 percent. Increases of 1 and 50 percent were reported for the Texas Gulf Coast and the Louisiana Gulf Coast area, respectively. In the other refinery districts, where quantities of stocks held are small, increases were reported for the Oklahoma-Kansas-Missouri, Texas Inland, and Arkansas-Louisiana Inland districts, and decreases were reported for the Appalachian, Rocky Mountain, and California districts.

Kerosine stocks held at refineries, representing 40 percent of the supply, declined 7 percent during 1954, while the larger proportion reported at bulk terminals and in pipelines dropped less than 1 percent during 1954. Year-end stocks were equivalent to a 50-day supply at the January 1955 daily rate of demand, compared with a 49-day supply on hand on December 31, 1953.

TABLE 58.—Salient statistics of kerosine in the United States, 1953–54, by districts and months

(Thousand barrels)

Month and district	Production		Yield (percent)		Exports		Domestic demand		Stocks, end period	
	1953	1954 [1]	1953	1954 [1]	1953	1954 [1]	1953	1954 [1]	1953	1954 [1]
Month:										
January	13,133	12,086	6.0	5.6	386	470	16,797	18,287	23,166	22,013
February	10.898	11,542	5.6	5.8	520	690	13,335	12,682	20,209	20,183
March	10,709	10,943	5.0	5.2	800	603	11,793	12,990	18,325	17,533
April	10.213	9,665	5.0	4.8	915	649	7,704	6,893	19,919	19,656
May	9,409	9,350	4.4	4.4	567	253	5.033	4,861	23,728	23,892
June	9,201	9,177	4.3	4.4	958	348	4,816	4,537	27,155	28,184
July	9,358	9,156	4.2	4.2	494	467	5,298	4,920	30,721	31,953
August	9,239	9,357	4.1	4.3	446	165	4,383	6,196	35.131	34,949
September	9,286	9,018	4.4	4.3	544	313	7,097	6,555	36,776	37,099
October	10,499	9,596	4.8	4.5	397	294	9,188	9,261	37,690	37,140
November	10,025	10,619	4.8	5.0	523	464	11,537	12,748	35,655	34,547
December	11,230	11,796	5.2	5.2	715	187	17,486	18,330	28,684	27,826
Total	123,200	122,305	4.8	4.8	7.265	4,903	114,467	118,260	28,684	27,826
District:										
East Coast	13,856	11,845	3.5	3.1	(2)	(2)	(2)	(2)	13,119	11,480
Appalachian	4,208	3,713	5.8	5.4					1,176	1,073
Indiana, Illinois, Kentucky, etc	28,665	26,958	6.2	5.8					7,548	7,296
Oklahoma, Kansas, etc	5,264	5,961	2.5	2.7					1,464	1,701
Texas Inland	4,049	3.658	4.2	4.1					356	373
Texas Gulf Coast	42,993	43,234	7.0	7.1					2,408	2,429
Louisiana Gulf Coast	17,937	20,588	8.8	9.7					1,537	2,304
Arkansas, Louisiana Inland, etc	2,788	2,863	8.6	8.3					455	586
Rocky Mountain	1,380	1.558	1.5	1.7					249	248
California	2,060	1,927	0.6	0.5					372	336
Total	123.200	122,305	4.8	4.8	7,265	4,903	114,467	118,260	28,684	27,826

[1] Preliminary figures.
[2] Not available

Kerosine sales increased 3 percent in 1954, mostly because of colder weather. This contrasts with a 7 percent decline in 1953. Kerosine sold for range oil (about three quarters of the total) also increased 3 percent. Sales for tractor fuel (less than 3 percent of the

TABLE 59.—Sales of kerosine in the United States, 1953–54, by States and uses

(Thousand barrels)

District[1] and State	Sold as range oil		Tractor fuel		All other uses		Total	
	1953	1954	1953	1954	1953	1954	1953	1954
District 1:								
Connecticut	4,527	4,625	16	14	137	367	4,680	5,006
Delaware	489	481	6	11	44	78	539	570
District of Columbia	200	187	3	3	94	83	297	273
Florida	1,604	1,823	107	109	703	769	2,414	2,701
Georgia	1,747	1,895	137	203	566	574	2,450	2,672
Maine	2,792	2,956	28	23	202	247	3,022	3,226
Maryland	1,340	1,493	98	108	519	533	1,957	2,134
Massachusetts	11,420	10,938	45	42	697	916	12,162	11,896
New Hampshire	1,262	1,350	12	9	32	32	1,306	1,391
New Jersey	3,742	3,782	41	25	1,397	1,433	5,180	5,240
New York	7,868	7,933	135	162	757	874	8,760	8,969
North Carolina	7,294	7,922	80	54	2,880	3,270	10,254	11,246
Pennsylvania	2,208	2,288	107	129	1,118	1,211	3,433	3,628
Rhode Island	2,459	2,439	46	38	72	68	2,577	2,545
South Carolina	3,167	3,263	34	41	1,191	1,182	4,392	4,486
Vermont	541	569	12	20	52	46	605	635
Virginia	2,033	2,326	20	19	887	968	2,940	3,313
West Virginia	199	224	3	6	127	132	329	362
Total	54,892	56,494	930	1,016	11,475	12,783	67,297	70,293
District 2:								
Illinois	3,298	3,383	287	223	1,272	1,371	4,857	4,977
Indiana	2,350	2,352	94	86	1,512	1,602	3,956	4,040
Iowa	1,631	1,705	254	243	755	799	2,640	2,747
Kansas	708	723	110	91	282	254	1,100	1,068
Kentucky	783	736	67	72	525	503	1,375	1,311
Michigan	3,430	3,644	113	90	1,566	1,654	5,109	5,388
Minnesota	1,419	1,691	19	17	645	620	2,083	2,328
Missouri	1,477	1,650	37	23	639	602	2,153	2,275
Nebraska	672	761	65	54	166	156	903	971
North Dakota	663	683	60	53	142	137	865	873
Ohio	1,542	1,619	80	72	532	721	2,154	2,412
Oklahoma	750	673	135	126	703	659	1,588	1,458
South Dakota	597	598	66	42	69	61	732	701
Tennessee	1,540	1,661	62	67	728	669	2,330	2,397
Wisconsin	1,580	1,689	74	72	762	864	2,416	2,625
Total	22,440	23,568	1,523	1,331	10,298	10,672	34,261	35,571
District 3:								
Alabama	905	901	72	137	686	643	1,663	1,681
Arkansas	787	751	76	124	527	519	1,390	1,394
Louisiana	589	605	151	118	685	625	1,425	1.348
Mississippi	522	518	115	87	588	582	1,225	1,187
New Mexico	174	178	13	14	69	53	256	245
Texas	1,770	1,603	310	257	2,328	2,126	4,408	3,986
Total	4,747	4,556	737	737	4,883	4,548	10,367	9.841
District 4:								
Colorado	214	205	14	17	43	48	271	270
Idaho	26	28	1	2	24	29	51	59
Montana	171	172	15	14	66	75	252	261
Utah	11	12	2	3	13	16	26	31
Wyoming	78	77	4	3	123	121	205	201
Total	500	494	36	39	269	289	805	822
District 5:								
Arizona	9	8	--------	--------	84	78	93	86
California	71	83	--------	--------	1,212	886	1,283	969
Nevada	1	2	--------	--------	11	11	12	13
Oregon	6	7	--------	--------	90	106	96	113
Washington	5	12	--------	--------	178	195	183	207
Total	92	112	--------	--------	1,575	1,276	1,667	1,388
Total United States	82,671	85,224	3,226	3,123	28,500	29,568	114,397	117,915

[1] States are grouped according to petroleum-marketing districts rather than to conventional geographic regions.

total) were slightly less than in 1953. About one fourth of the total was sold for other purposes; such as, lamp fuel, insecticides, orchard heating, weed burning, and tobacco curing, and the total sold for these purposes increased 4 percent in 1954.

Sales of range oil, which is mostly kerosine plus some No. 1 fuel oil, increased approximately 3 percent in 1954. The kerosine portion of the range oil sales increased 3 percent in 1954 while the No. 1 fuel-oil portion remained virtually unchanged from 1953.

TABLE 60.—Sales of range oil[1] in the United States, 1952–54, by States

(Thousand barrels)

State	1952	1953	1954	
			Total	Percent of United States total
Massachusetts	12,744	12,107	11,610	11.5
New York	8,732	8,467	8,466	8.4
North Carolina	7,589	7,512	8,179	8.1
Illinois	6,555	6,160	6,241	6.2
Michigan	5,335	5,516	6,217	6.2
Connecticut	5,131	4,795	4,857	4.8
New Jersey	4,527	4,140	4,071	4.0
South Carolina	3,258	3,234	3,334	3.3
Indiana	3,330	3,138	3,225	3.2
Maine	3,090	3,005	3,174	3.2
Wisconsin	3,210	3,069	3,126	3.1
Minnesota	2,724	2,510	2,630	2.6
Pennsylvania	2,652	2,469	2,533	2.5
Rhode Island	2,782	2,562	2,531	2.5
Virginia	2,091	2,119	2,409	2.4
Missouri	2,389	2,245	2,406	2.4
Iowa	2,377	2,276	2,278	2.3
Ohio	2,246	2,139	2,209	2.2
Georgia	1,917	1,836	1,981	2.0
Texas	2,386	2,205	1,963	1.9
Florida	1,751	1,672	1,900	1.9
Tennessee	1,594	1,615	1,732	1.7
Maryland	1,541	1,401	1,549	1.5
New Hampshire	1,443	1,360	1,432	1.4
Kentucky	1,066	1,073	1,078	1.1
All other	10,353	9,648	9,670	9.6
Total	102,813	98,273	100,801	100.0

[1] Includes mostly kerosine but also a small quantity of No. 1 fuel oil.

In 1954, as in 1953, there were no important changes in representative kerosine prices. The quotation for 42°- to 44°-gravity, water-white kerosine at Oklahoma refineries and intended for shipments to northern destinations was changed several times during 1954. A posting of 9.06 cents a gallon dating from late June 1953 was increased to an average of 9.18 cents in January 1954. From February through June the average price was 9.31 cents a gallon. A "low" of 9.25 cents was reached in early July, and this quotation remained in force until the second week in September. Subsequent changes in November and December resulted in a price of 9.69 cents a gallon at the year end. Many minor changes in the 1954 price for kerosine and/or No. 1 fuel oil at New York Harbor resulted in a "high" of 11 cents a gallon in late January and a "low" of 10.08 cents in July and August. The average for the year was 10.43 cents a gallon compared with 10.68 cents for 1953. The tank-wagon price

TABLE 61.—Monthly average prices of kerosine in the United States, 1953–54, cents per gallon

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1953													
42°-44° gravity, water-white kerosine at refineries, Oklahoma	8.88	8.78	8.57	8.56	8.56	8.86	9.06	9.06	9.06	9.06	9.06	9.06	8.88
Kerosine (and/or No. 1 fuel oil) at New York Harbor	10.75	10.75	10.75	10.73	10.50	10.59	10.68	10.63	10.63	10.90	10.83	10.50	10.68
Kerosine, tank-wagon at Chicago	15.80	15.80	15.80	15.80	15.80	15.95	16.30	16.30	16.30	16.30	16.30	16.30	16.06
Kerosine, tank-wagon at New York City[1]	14.40	14.40	14.40	14.40	14.10	14.26	14.57	14.50	14.50	15.00	14.83	14.50	14.49
1954													
42°-44° gravity, water-white kerosine at refineries, Oklahoma	9.18	9.30	9.31	9.31	9.31	9.31	9.26	9.25	9.30	9.31	9.37	9.50	9.52
Kerosine (and/or No. 1 fuel oil) at New York Harbor	10.71	11.00	10.81	10.50	10.21	10.17	10.08	10.08	10.09	10.35	10.35	10.87	10.43
Kerosine, tank-wagon at Chicago	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30
Kerosine, tank-wagon at New York City[1]	14.80	15.10	14.75	14.75	14.23	14.20	14.20	14.20	14.21	14.35	14.35	14.89	14.50

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[1] Manhattan and Queens.

of 16.3 cents a gallon for kerosine in Chicago, which dated from June 1953, remained unchanged throughout 1954. Kerosine sold from tank wagons in the boroughs of Manhattan and Queens of the New York City area was marked up from 14.5 cents a gallon in November 1953, to a 1954 "high" of 15.2 cents in late January. A "low" of 14.2 cents was posted in early May, and later markups resulted in a price of 14.95 cents a gallon on December 4, 1954.

Oil companies operating in district 5 shipped 11,000 barrels of kerosine to other Western States by rail and truck in 1954 compared with 16,000 in 1953. Imports and other receipts of kerosine into the West Coast marketing area declined from 2,000 barrels in 1953 to 1,000 in 1954.

Tanker and barge shipments of kerosine from the Gulf Coast to the Atlantic seaboard, which have declined in recent years, rose to 41.4 million barrels in 1954 compared with 38.9 in 1953. Quantities loaded in Texas increased from 30.3 million barrels in 1953 to 31.7 in 1954, and those loaded in Louisiana were also larger—9.7 million barrels in 1954 compared with 8.6 in 1953.

Barge shipments of kerosine from the Gulf Coast and Arkansas up the Mississippi River and its tributaries increased 14 percent to 5.8 million barrels in 1954. Barge shipments that originated in Texas rose from 1.6 million barrels in 1953 to 2.1 in 1954, while shipments from Louisiana totaled 2.7 million barrels in both years. Shipments credited to Arkansas were 0.8 million barrels in 1953 and 1.0 in 1954. Virtually all was shipped to district 2 (5.7 million barrels in 1954 compared with 5.0 in 1953), although small quantities went to district 1.

Tanker freight for kerosine destined for New York Harbor from the Gulf Coast continued the downward trend of recent years. The average rate for the year was 26 cents a barrel compared with 31 cents in 1953, according to Platt's Oil Price Handbook. A charge of 32.3 cents on January 1, 1954 was changed many times until it reached a "low" of 19.7 cents in July. The trend thereafter, with the coming of the heating season, was gradually upwards until the "high" of the year, 42.4 cents a barrel in this freight charge, was posted on December 21, 1954.

DISTILLATE FUEL OIL

About 99 percent of the distillate fuel-oil supply came from refineries in both 1953 and 1954, and the 1954 production was greater by 3 percent. "Transfers" from crude petroleum and imports in 1954, both minor sources of distillate fuel oils, were 24 and 5 percent, respectively, lower than the 1953 totals. A small amount was taken from storage in 1954 to meet the demand.

The overall demand for distillate fuel oil increased 6 percent in 1954. Domestic requirements were 8 percent larger in 1954, whereas exports were off 25 percent. The domestic market absorbed 96 percent of the available supply in 1954, and exports accounted for the other 4 percent.

Domestic demand for distillate fuel oil increased 8 percent in 1954, largely because of colder weather. The greater number of domestic burners in use was also a factor, although the average number in use increased only 9 percent compared with 11 percent in 1953. The

TABLE 62.—Salient statistics of distillate fuel oil in the United States, 1953–54, by months and districts

(Thousand barrels)

Month and district	Production		Yield (percent)		Transfers, east of California [1]		Imports		Exports		Domestic demand		Stocks, end of period	
	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]
Month:														
January	47,132	45,474	21.6	21.1	233	150	285	156	2,349	1,780	63,541	74,697	80,448	81,044
February	41,721	43,256	21.3	21.7	189	128	507	159	3,764	1,468	52,361	52,729	66,740	70,390
March	45,840	45,204	21.5	21.4	176	143	394	236	3,330	1,652	50,328	54,051	59,492	60,270
April	42,433	41,218	20.8	20.4	151	135	319	317	3,136	2,114	38,137	38,105	61,122	61,721
May	43,005	42,531	20.2	20.0	145	138	136	262	2,928	2,176	28,066	28,895	73,414	73,581
June	43,211	41,966	20.3	20.1	143	119	112	306	3,007	2,430	29,866	27,217	84,007	86,325
July	44,439	43,892	20.0	20.3	166	123	507	199	2,401	2,018	24,550	26,864	102,168	101,657
August	44,190	45,048	19.8	20.8	170	112	423	461	1,640	1,546	26,091	29,203	119,220	116,529
September	43,076	45,415	20.3	21.5	143	105	231	251	2,199	1,646	34,110	32,593	126,361	128,061
October	45,149	47,890	21.0	22.4	155	113	71	299	2,591	2,342	33,890	34,893	135,255	139,128
November	43,520	48,666	20.7	22.9	144	119	177	163	2,273	2,911	43,762	51,279	133,061	133,886
December	44,395	51,718	20.5	22.9	151	115	217	386	2,710	2,118	63,373	75,843	111,741	108,144
Total	528,111	542,278	20.7	21.3	1,966	1,500	3,379	3,195	32,328	24,201	488,075	526,369	111,741	108,144
District:														
East Coast	91,647	93,444	23.4	24.4	-------	-------	(3)	(3)	(3)	(3)	(3)	(3)	42,795	38,452
Appalachian	12,102	12,966	16.6	18.9	-------	-------							2,347	2,802
Indiana, Illinois, Kentucky, etc.	80,955	88,837	17.4	19.1	343	300							19,006	19,132
Oklahoma, Kansas, etc.	49,005	51,027	22.9	23.2	321	173							11,101	11,760
Texas Inland	15,687	15,462	16.4	17.4	773	603							2,104	2,070
Texas Gulf Coast	145,650	143,807	23.8	23.5	240	162							12,346	14,012
Louisiana Gulf Coast	50,351	54,761	24.6	25.7	54	40							5,558	4,329
Arkansas, Louisiana Inland, etc.	7,083	7,575	21.8	21.9	59	23							938	1,476
Rocky Mountain	19,810	21,192	21.4	22.6	176	199							2,378	2,167
California	55,821	53,207	15.0	14.3	-------	-------							13,168	11,944
Total	528,111	542,278	20.7	21.3	1,966	1,500	3,379	3,195	32,328	24,201	488,075	526,369	111,741	108,144

[1] Figures represent crude oil used as fuel on pipelines, which is considered part of the demand for distillate.
[2] Preliminary figures.
[3] Figures not available.

weather, measured by degree-days, was 9 percent colder in the opening quarter of 1954, and the distillate-fuel-oil demand rose accordingly. The second quarter of 1954 was 9 percent warmer than the corresponding period of the previous year, and requirements for this fuel declined 2 percent. Colder weather in the second half of the year resulted in a 5-percent gain in the domestic demand for distillate fuel oil in the third quarter and a 15-percent gain in the closing 3 months.

In 1954 sales of distillate fuel oils continued the upward trend of recent years. A large net gain in sales in 1954 was mostly because of a 14-percent increase in heating-oil requirements, the result of colder weather (as measured by degree-days) and a 9-percent increase in domestic oil burners in use. Other factors were a small gain in sales of diesel fuel to railroads, and the expanding use of diesel fuel in on- and off-highway equipment.

The lower sales of distillate fuel oils, mostly diesel grades, to vessels were more pronounced in the coastal and inland waterways traffic, as indicated deliveries in this trade declined 12 percent in 1954. Sales to vessels engaged in foreign trade were also off but to a lesser degree. Purchases by these vessels, as reported by the Bureau of the Census, United States Department of Commerce, were 9.0 million barrels in 1954, or 5 percent less than in 1953.

The Federal Power Commission reported an 8-percent decline in the consumption of diesel fuel by electric-power-generating plants from 4.8 million barrels in 1953 to 4.4 million in 1954. Manufactured-gas companies consumed only 1.5 million barrels of light fuel oils in 1954 compared with 1.9 million in 1953, according to records compiled by the American Gas Association. Thus sales of distillate fuel oil to gas and electric power plants were off 11 percent in 1954. Slightly curtailed crude-oil production and runs to stills at refineries are reflected in the small decline in the use of distillate fuel oils by oil companies.

TABLE 63.—Sales of distillate fuel oil[1] in the United States, 1950–54, by uses

(Thousand barrels)

Use	1950	1951	1952	1953	1954	Percent change
Railroads	48, 703	59, 962	68, 002	75, 246	77, 389	2. 8
Vessels (including tankers)	12, 872	14, 393	17, 213	16, 898	15, 563	−7. 9
Gas and electric power plants	13, 207	9, 612	8, 350	6, 825	6, 070	−11. 1
Smelters, mines, and manufacturing industries	37, 121	42, 567	42, 760	42, 384	41, 589	−1. 9
Heating oils	220, 947	249, 758	263. 379	267, 498	304, 540	13. 8
Fuel oil (No. 1) sold as range oil	14, 793	16, 224	15, 947	15, 602	15, 577	−. 2
U. S. Army, Navy, Air Force, and Coast Guard	6, 553	8, 430	9, 644	9, 569	8, 752	−8. 5
Oil company fuel	5, 692	7, 811	7, 976	7, 755	7, 699	−. 7
Miscellaneous uses	35, 418	40, 151	45, 939	47, 067	49, 066	4. 2
Total United States	395, 306	448, 908	479, 210	488, 844	526, 245	7. 7

[1] Includes diesel fuel.

TABLE 64.—Sales of distillate fuel oil[1] in the United States, 1950–54, by districts and States

(Thousand barrels)

District[2] and State	1950	1951	1952	1953	1954
District 1:					
Connecticut	11,067	11,777	12,286	12,520	14,928
Delaware	1,285	1,556	1,702	1,861	2,365
District of Columbia	2,433	2,982	3,368	3,458	3,728
Florida	4,648	5.343	6,863	7.176	8,441
Georgia	3.202	3.962	4,262	4,119	4,225
Maine	3.496	3,935	4,276	4,514	5,309
Maryland	8,981	10.898	11,189	11,731	14,468
Massachusetts	22,769	27,261	28,064	27,925	31,306
New Hampshire	2,765	3.102	3,442	3.370	4,220
New Jersey	30,521	32,298	33,028	33,124	35,733
New York	52,173	56,334	59,373	59,604	64,262
North Carolina	4,354	5,490	6.360	7,381	7,860
Pennsylvania	28,266	34,585	35,827	36.513	40,288
Rhode Island	4,116	4,260	4.343	4,482	4.484
South Carolina	1,854	2,202	2,491	3,004	2,990
Vermont	1,117	1,166	1,212	1,321	1,415
Virginia	7,855	9,156	9.800	9,442	10 888
West Virginia	651	1,229	1,188	1,331	1,307
Total	191,553	217,536	229,074	232.876	258,217
District 2:					
Illinois	26,320	28,517	29,061	29.021	30,388
Indiana	10,776	13,205	13,968	15,166	16,294
Iowa	8,925	9,791	10.204	10,488	10.399
Kansas	4,527	5,552	5,695	5,938	5,897
Kentucky	2.274	2,753	3,250	3.359	3.291
Michigan	18.493	20,334	22,268	22,351	24,625
Minnesota	12,448	14.560	15,478	15,784	16.218
Missouri	7,815	8,684	10,224	10,854	11,283
Nebraska	3,707	3,829	4.071	4,378	4,723
North Dakota	1,939	2.026	2.456	2,425	2,600
Ohio	12,059	14,474	15,953	16,542	18,150
Oklahoma	1,928	2,223	2,192	2,436	2.368
South Dakota	1,893	2,133	2,399	2,626	2,756
Tennessee	3.062	3,428	3,487	3,628	3,529
Wisconsin	10,285	11,437	11,803	11,877	13,648
Total	126,451	142,946	152,509	156,873	166.169
District 3:					
Alabama	2,692	2,846	3,073	3,186	3,508
Arkansas	2,414	2,244	2,325	2,222	2,136
Louisiana	4,619	5,224	5,840	6,212	6,242
Mississippi	1,271	1,507	1.502	1,774	1,619
New Mexico	950	972	1,224	1.309	1,457
Texas	12,790	16,183	19,022	19.046	18,913
Total	24,736	28,976	32,986	33,749	33,875
District 4:					
Colorado	1,831	2,036	2,503	2,732	3,108
Idaho	1,770	2,291	2,457	2,595	3,080
Montana	2,478	2,851	3,063	3,553	3,755
Utah	2,001	2,334	3,263	3.542	3,574
Wyoming	1,732	1,893	2,103	2,294	2,624
Total	9,812	11,405	13,389	14,716	16,141
District 5:					
Arizona	1.020	1,233	1,341	1,329	1,279
California	19.212	22,031	23,875	24,063	23,812
Nevada	1,843	2,102	2,158	2,281	2,375
Oregon	7,725	8,534	8,974	8,680	8,939
Washington	12,954	14,145	14,904	14,277	15,438
Total	42,754	48,045	51,252	50,630	51,843
Total United States	395,306	448,908	479,210	488,844	526,245

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[1] Includes diesel fuel oil.

[2] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.

Exports of distillate fuel oil to foreign countries and shipments to noncontiguous Territories dropped sharply in 1954 as additional supplies from other world areas became available. These exports were off 25 percent in 1954 compared with a nominal 4-percent decline in 1953. The following countries showed important decreases in total exports: Netherlands Antilles, 5.0 million barrels in 1953 and 1.7 in 1954; Sweden, 1.4 in 1953 and 0.2 in 1954; and the United Kingdom, 5.7 in 1953 and 4.6 in 1954. Exports of distillate fuel oil to Canada dropped only nominally from 9.9 million barrels in 1953 to 9.7 in 1954, while quantities sent to Mexico increased from 0.4 in 1953 to 2.4 million barrels in 1954.

Although crude runs at petroleum refineries were slightly lower in 1954 than in 1953, there was a 3-percent gain in the production of distillate fuel oils because of higher percentage yield (20.7 percent in 1953 and 21.3 percent in 1954). Most refinery districts showed gains in distillate fuel oil production in 1954; however, the Texas Gulf Coast, the source of 27 percent of the total, reported a decline of 1 percent in production for the year. Production also declined 1 percent in the Texas Inland area, where about 3 percent of the distillate fuel oil is made. California, with 10 percent of total production, recorded a 5-percent decline in output. Increases in distillate-fuel-oil production ranged from 2 percent for the east coast, a source of about 17 percent of this fuel, to 10 percent for the Indiana-Illinois-Kentucky group of States, which produced 16 percent of the refinery output.

Some pipeline companies use light crude oil as fuel, and quantities so used are considered part of the distillate-fuel-oil supply and are known as "transfers." Transfers have declined sharply in volume in recent years and there was a further decline of 24 percent in 1954. They represent less than 1 percent of the overall distillate-fuel-oil supply. Most of these "transfers" are made in the Texas Inland and the Indiana-Illinois-Kentucky refining districts. None are credited to the east coast, Appalachian, or California areas.

Imports of distillate fuel oil, which are not an important source of supply, declined slightly (5 percent) in 1954 after having increased significantly in previous years. The quantity from the Netherlands Antilles declined from 2.3 million barrels in 1953 to 1.3 in 1954, while the quantity from Venezuela dropped even more drastically, percentage wise (from 0.6 in 1953 to 0.1 million barrels in 1954). Distillate fuel oil imported from Saudi Arabia increased from 0.8 million barrels in 1953 to 1.1 in 1954.

Year-end stocks of distillate fuel oil were off 3 percent from 1953. Quantities in the east coast area, representing over a third of the supply, declined 10 percent in 1954. There was a similar percentage loss in California, where about 11 percent of the total was held. Declines in stocks in 1954 also were reported for the Texas Inland, Louisiana Gulf, and Rocky Mountain areas; however, the quantities involved were relatively unimportant. The Texas Gulf, credited with about 13 percent of the 1954 distillate-fuel-oil stocks, and the Oklahoma-Kansas-Missouri district, with 11 percent of the total, had gains of 14 and 6 percent, respectively, during the year. Distillate stocks in the Indiana-Illinois-Kentucky refinery district, accounting for about 18 percent of the national total, increased 1 percent in

1954. Also, there were large percentage increases in year-end inventories in the Appalachian and the Arkansas-Louisiana Inland areas, although the quanties held there were not important in volume.

About 52 percent of the distillate-fuel-oil stocks was reported held at petroleum refineries on December 31, 1954, 2 percent less than the 1953 total. Stocks held at bulk plants and in pipelines declined 5 percent during 1954.

Year-end stocks of distillate fuel oils represented a 45-day domestic supply at the January 1955 daily rate of demand, compared with a 46-day supply on hand December 31, 1953.

Rail and truck shipments of distillate fuel oil from California to other Western States comprised 458,000 barrels in 1954, slightly higher than the 1953 total (456,000 barrels). No tanker shipments of distillate fuel oils from California to the East Coast were reported in 1954, and only 6,000 barrels had been reported in 1953. Distillate fuel oil brought into the Pacific Coast marketing area, including imports, totaled 3.7 million barrels in 1954 and 2.9 million in 1953. These receipts from outside sources represented about 7 percent of the total supply in 1954 compared with 5 percent in 1953.

Distillate fuel oil shipped by tanker and barge from the Gulf Coast to ports on the East Coast increased 11 percent (from 131.7 million barrels in 1953 to 145.5 in 1954). The quantity loaded at Texas terminals increased from 106.1 million barrels in 1953 to 114.0 in 1954, while that loaded in Louisiana increased from 25.6 million in 1953 to 31.5 million barrels in 1954.

Relatively important quantities of distillate fuel oils from Texas, Louisiana, Arkansas, and Mississippi are transported up the Mississippi River and its tributaries by barge to markets in districts 1 and 2. The light fuel oil thus transported increased slightly from 7.7 million barrels in 1953 to 7.8 in 1954. The quantity loaded in Texas rose from 1.4 million barrels in 1953 to 1.8 in 1954, while that from Louisiana declined from 4.7 in 1953 to 3.9 million barrels in 1954. The quantities credited to Arkansas and Mississippi were 1.6 million barrels in 1953 and 2.1 in 1954. Most of this distillate fuel oil was unloaded in district 2—7.4 million barrels in both 1953 and 1954. Minor quantities—0.3 million barrels in 1953 and 0.4 in 1954—reached district 1. None was terminated in district 3 in either year.

The tanker rates on No. 2 distillate fuel oil shipped from Gulf ports to New York Harbor fluctuated considerably in 1954, according to Platt's Oil Price Handbook. A rate of 34.4 cents a barrel in early January slumped to a "low" of 21 cents in July. An upward trend in the fall and early winter months increased the rate to a "high" of 44.5 cents a barrel on December 21, 1954. The average for the year was 27.7 cents a barrel, compared with 32.6 cents in 1953.

Representative distillate-fuel-oil prices in 1954 varied little from those prevailing in 1953. No. 2 straw fuel oil at Oklahoma refineries, intended for shipment to northern destinations and priced at 8.13 cents a gallon since July 1953, was increased to 8.17 cents in January 1954. Thereafter, the price fluctuated until a "high" of 8.81 cents a gallon was announced on December 30, 1954. The New York Harbor price of No. 2 distillate fuel oil—9.5 cents a gallon since November 23, 1953—was changed several times in January and

TABLE 65.—Monthly average prices of distillate fuel oil and diesel fuel in the United States, 1953–54

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1953													
No. 2 Straw fuel oil at refineries, Oklahoma cents per gallon	7.88	7.74	7.57	7.57	7.57	7.80	8.13	8.13	8.13	8.13	8.13	8.13	7.91
No. 2 fuel oil at New York Harbor do	9.75	9.75	9.75	9.73	9.50	9.59	9.68	9.63	9.63	9.90	9.83	9.50	9.68
Diesel oil, shore plants, New York Harbor do	10.20	10.20	10.20	10.20	10.20	10.27	10.32	10.28	10.28	10.34	10.24	9.90	10.22
Diesel oil for ships:													
New York dollars per barrel	4.24	4.24	4.24	4.24	4.24	4.29	4.36	4.34	4.34	4.34	4.27	4.13	4.27
New Orleans do	3.49	3.49	3.49	3.49	3.49	3.56	3.74	3.74	3.74	3.74	3.74	3.74	3.62
San Pedro do	3.44	3.67	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.09
1954													
No. 2 Straw fuel oil at refineries, Oklahoma cents per gallon	8.17	8.41	8.44	8.41	8.44	8.44	8.34	8.31	8.36	8.38	8.38	8.53	8.38
No. 2 fuel oil at New York Harbor do	9.71	9.98	9.78	9.50	9.21	9.17	9.08	9.17	9.22	9.60	9.60	10.12	9.51
Diesel oil, shore plants, New York Harbor do	10.12	10.40	10.29	9.90	9.61	9.57	9.48	9.57	9.63	10.00	10.00	10.52	9.92
Diesel oil for ships:													
New York dollars per barrel	4.19	4.29	4.24	4.08	3.90	3.89	3.89	3.89	3.90	4.05	4.05	4.27	4.05
New Orleans do	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.84	3.86	3.94	3.77
San Pedro do	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20

reached 10 cents at the end of the month. A "low" of 9.2 cents a gallon was posted on May 4, and again on August 9 and the "high" of the year of 10.2 cents was posted December 7, 1954.

The price of diesel fuel at shore plants near New York Harbor varied from 9.48 cents a gallon on June 24 to 10.6 cents on December 7, 1954. Light diesel oil for ships' bunkers at New York Harbor changed from $4.17 a barrel in January 1954 to $3.89 in May and up to $4.30 a barrel at the year end. Light diesel for vessels at New Orleans, La., posted at $3.74 a barrel on June 1953, was raised to $3.86 in October 1954 and to $3.95 a barrel in December. The price for ships' diesel at San Pedro, Calif., which was posted at $4.20 a barrel in late February 1953, was not changed during 1954.

RESIDUAL FUEL OIL

The overall supply of residual fuel oil in 1954 was 6 percent below the 1953 total. Production, which accounted for about three-quarters of the available quantity, was 7 percent lower, while imports, which made up a quarter of the supply, were 2 percent lower. "Transfers" or heavy crude petroleum which is used as fuel on leases or for general industrial purposes and is not relatively important in volume increased 6 percent in 1954. The domestic demand for heavy grades of fuel oil declined 7 percent. This loss in the domestic market for residual fuel oil was largely due to the sharp decline in the demand for this fuel by vessels engaged in foreign trade, by railroads, and electric-power plants. Exports of heavy fuel oils, which represent about 5 percent of total requirements, were up 3 percent in 1954. The lower demand for residual fuel oils resulted in a large increase in the quantity diverted to storage.

The recent recession in the domestic market for residual fuel oil, first evident in the final quarter of 1953, continued throughout 1954. In the first quarter of 1954 demand was off 6 percent from the corresponding 1953 quarter. In the second and third quarters, when heating requirements were not important, demand was off 11 and 10 percent, respectively. An upturn was evident in the last quarter, however, when demand was less than 2 percent smaller than in the same quarter of 1953.

Sales of residual fuel oils, for all uses except oil-company fuel and miscellaneous uses, declined in 1954 (table 67). The 2-percent gain in the heavy fuel oils used by the oil industry was due mostly to a large increase in the California area where petroleum refineries made a pronounced shift from natural gas to oil fuel during 1954.

The sharp decrease in the quantity of residual fuel oil sold to railroads in 1954 as in previous years was the result of the diminishing use of oil burning locomotives and the shift to diesel equipment. Heavy bunker oils delivered to vessels engaged in foreign trade declined 9 percent from 68.2 million barrels in 1953 to 62.4 million in 1954, while there was little change in the indicated quantities of 46.1 million barrels in 1953 and 46.4 million in 1954 purchased by vessels using coastal and inland waters. The 17-percent drop in sales of residual fuel oils to gas and electric power plants in 1954 was due mostly to increased use of coal and natural gas at these plants. The Federal Power Commission reported a 19-percent drop in the con-

TABLE 66.—Salient statistics of residual fuel oil in the United States, 1953–54, by months and districts

(Thousand barrels)

Month and district	Production		Yield (percent)		Transfers [1]				Imports		Exports		Domestic demand		Stocks, end of period	
					East of California		California									
	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]
By months:																
January	40,515	39,398	18.5	18.3	372	326	164	71	15,424	13,815	1,839	1,770	57,432	53,736	45,910	47,474
February	35,704	34,754	18.3	17.5	275	337	131	115	11,958	13,217	1,953	2,104	47,847	46,674	44,178	47,119
March	38,931	36,222	18.3	17.1	298	320	185	141	12,898	12,033	2,350	2,792	52,540	48,794	41,600	44,249
April	36,572	34,215	17.9	16.9	296	342	150	189	10,307	9,748	2,366	2,203	46,987	42,178	39,572	44,362
May	37,120	35,582	17.5	16.7	317	345	185	190	10,846	8,143	2,059	2,619	44,186	38,994	41,795	47,009
June	37,151	33,691	17.5	16.1	304	315	177	150	9,241	9,212	2,117	2,408	42,750	37,753	43,801	50,216
July	37,942	33,749	17.1	15.6	292	323	208	220	8,239	7,860	1,765	2,386	40,751	35,617	47,966	54,365
August	37,894	33,131	17.0	15.3	302	339	198	225	6,794	7,283	2,385	2,077	40,762	36,934	50,007	56,332
September	36,098	32,569	17.0	15.4	274	314	242	167	8,419	8,206	2,254	1,982	42,270	38,904	50,516	56,702
October	36,716	33,047	17.1	15.4	257	361	172	169	9,866	10,546	2,580	1,869	44,127	42,415	50,820	56,541
November	36,684	33,593	17.5	15.8	316	329	71	152	12,645	12,622	2,341	2,301	46,928	46,045	51,267	54,891
December	38,652	36,806	17.8	16.3	290	334	141	150	14,896	16,324	1,982	2,345	53,894	54,055	49,370	52,105
Total	449,979	416,757	17.6	16.4	3,593	3,985	2,024	1,939	131,533	129,009	25,991	26,856	560.474	522,099	49,370	52,105
By districts:																
East Coast	84,650	76,965	21.6	20.1					(3)	(3)	(3)	(3)	(3)	(3)	11,530	9,360
Appalachian	9,931	7,158	13.6	10.4											1,103	658
Indiana, Illinois, Kentucky, etc	63,244	59,948	13.6	12.9	734	747									4,439	3,660
Oklahoma, Kansas, etc	18,774	15,357	8.8	7.0	326	220									1,157	1,260
Texas Inland	12,243	9,105	12.8	10.3	545	799									1,422	1,368
Texas Gulf Coast	88,874	82,641	14.5	13.5	282	271									6,221	4,086
Louisiana Gulf Coast	18,677	15,607	9.1	7.3	664	677									1,537	1,328
Arkansas, Louisiana Inland, etc	2,514	2,471	7.7	7.1	278	319									177	121
Rocky Mountain	16,288	14,440	17.6	15.4	764	952									735	835
California	134,784	133,065	36.1	35.9			2,024	1,939							21,049	29,429
Total	449,979	416,757	17.6	16.4	3,593	3,985	2,024	1,939	131,533	129,009	25,991	26,856	560,474	522,099	49,370	52,105

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[1] Represents crude oil used as fuel on leases and for general industrial purposes.
[2] Preliminary figures.
[3] Figures not available.

sumption of fuel oil by electric power plants from 77.4 million barrels in 1953 to 62.4 million in 1954. Also demand for heavy fuel oils by manufactured-gas companies was off 1.3 million barrels in 1954, according to statistics released by the American Gas Association.

TABLE 67.—Sales of residual fuel oil[1] in the United States, 1950–54, by uses

(Thousand barrels)

Use	1950	1951	1952	1953	1954	Percent change
Railroads	60, 878	54, 998	40, 489	28, 477	16, 122	−43. 4
Vessels (including tankers)	92, 947	107, 007	110, 412	114, 324	108, 790	−4. 8
Gas and electric power plants	93, 062	70, 550	70, 497	85, 352	70, 749	−17. 1
Smelters, mines, and manufacturing industries	148, 111	157, 279	158, 373	166, 748	160, 473	−3. 8
Heating oils	72, 716	76, 164	79, 151	81, 824	78, 493	−4. 1
U. S. Army, Navy, Air Force, and Coast Guard	28, 333	38, 054	37, 185	30, 435	26, 887	−11. 7
Oil company fuel	53, 263	54, 056	54, 421	51, 243	52, 165	1. 8
Miscellaneous uses	4, 898	5, 280	5, 745	6, 326	7, 035	11. 2
Total United States	554, 208	563, 388	556, 273	564, 729	520, 714	−7. 8

[1] Includes Navy grade and crude oil burned as fuel.

Exports and shipments of residual fuel oil to noncontiguous Territories increased 3 percent in 1954. The more important quantities went to Canada, 5.8 million barrels; Mexico, 2.6 million; Cuba, 1.4 million; Chile, 1.9 million; and Japan, 6.3 million.

The decline (7 percent) in the production of residual fuel oil in 1954 was due almost entirely to a lower percentage yield, as there was very little change in crude runs. Both output and percentage yields were lower in all refinery districts. In the California district, which is credited with about a third of the heavy fuel oil production, the decline was only 1 percent, whereas in the Texas Gulf Coast area, with a fifth of the output, the loss was 7 percent. In the East Coast district, where approximately another fifth of the heavy fuel oil originates, the decline in output was 9 percent. The Indiana-Illinois-Kentucky district, which had about 14 percent of the production, reported a loss of 5 percent. The decline in the other refinery districts ranged from 2 percent in the Arkansas-Louisiana Inland area to 28 percent in the Appalachian district.

Heavy crude petroleum used as fuel in the oil fields and for general industrial purposes and designated as "transfers" comprised about 1 percent of the total supply and increased 6 percent in 1954. "Transfers" in California declined 4 percent, while those in other refinery areas increased 11 percent.

Imports of residual fuel oils decreased 2 percent in 1954. Imports of heavy grades of fuel oil comprised about a quarter of the total available supply. The chief sources were Netherlands Antilles (79.4 million barrels) and Venezuela (42.5 million barrels).

The 6-percent increase in residual fuel oil stocks was largely the result of an important increase (40 percent) in the California refinery district, where nearly three-fifths of stocks were reported at the year end. The only other refinery areas that reported gains in stocks were the Oklahoma-Kansas-Missouri and the Rocky Mountain districts, where the quantities are relatively unimportant. Stock declines in

TABLE 68.—Sales of residual fuel oil[1] in the United States, 1950–54, by districts and States

(Thousand barrels)

District [2] and State	1950	1951	1952	1953	1954
District 1:					
Connecticut	16,845	14,888	13,475	14,377	12,897
Delaware	2,373	1,888	2,501	2,558	2,228
District of Columbia	1,188	1,688	1,915	2,035	1,963
Florida	17,009	20,322	24,789	27,343	28,909
Georgia	4,733	5,619	5,816	6,573	5,590
Maine	3,550	3,178	4,032	4,228	3,481
Maryland	14,168	15,814	14,852	15,323	14,031
Massachusetts	30,715	29,883	30,003	32,763	30,500
New Hampshire	1,873	2,326	2,295	2,467	2,129
New Jersey	49,092	44,775	44,153	47,667	43,339
New York	61,829	52,684	50,966	53,437	50,809
North Carolina	990	1,109	1,257	1,439	1,809
Pennsylvania	41,110	42,614	42,491	42,951	42,734
Rhode Island	10,891	10,030	9,756	10,993	9,473
South Carolina	3,652	4,145	5,230	5,332	3,985
Vermont	382	300	300	475	409
Virginia	12,883	18,037	20,294	15,523	12,998
West Virginia	1,587	1,464	1,337	1,526	1,269
Total	274,870	270,764	275,462	287,010	268,553
District 2:					
Illinois	19,517	20,257	20,455	20,823	20,499
Indiana	15,841	16,850	17,230	17,679	14,234
Iowa	1,321	1,365	1,217	1,051	884
Kansas	5,893	7,110	6,071	5,247	4,020
Kentucky	1,260	1,007	738	913	949
Michigan	12,708	13,743	14,153	14,809	14,675
Minnesota	2,432	2,431	2,430	2,370	2,352
Missouri	5,389	5,379	5,146	5,140	4,837
Nebraska	550	467	334	351	313
North Dakota	297	224	120	124	179
Ohio	18,004	18,017	17,670	18,698	18,118
Oklahoma	4,783	3,890	3,011	2,351	1,479
South Dakota	294	231	239	232	165
Tennessee	1,398	1,331	1,097	1,257	652
Wisconsin	1,712	1,861	2,042	2,118	2,109
Total	91,399	94,163	91,953	93,163	85,465
District 3:					
Alabama	2,271	2,417	2,677	3,873	3,123
Arkansas	2,273	2,051	1,497	1,006	415
Louisiana	11,221	10,953	10,422	9,929	9,710
Mississippi	348	257	173	163	160
New Mexico	696	532	831	696	262
Texas	48,560	50,464	46,508	41,978	36,312
Total	65,369	66,674	62,108	57,645	49,982
District 4:					
Colorado	1,050	1,068	1,203	1,124	1,326
Idaho	629	945	1,029	1,067	1,115
Montana	4,222	4,958	4,220	3,276	1,751
Utah	4,767	4,979	4,851	5,044	4,321
Wyoming	3,024	3,252	2,819	2,762	2,076
Total	13,692	15,202	14,122	13,273	10,589
District 5:					
Arizona	1,448	1,157	542	206	45
California	78.397	85,884	79,127	85,870	79,973
Nevada	2,889	2,685	2,266	2,048	1,353
Oregon	12,429	12,215	13,168	11,186	9,776
Washington	13,715	14,644	17,025	14,328	14,978
Total	108,878	116,585	112,128	113,638	106,125
Total United States	554,208	563,388	555,773	564,729	520,714

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[1] Includes some crude oil burned as fuel.

[2] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.

1954 in areas where the quantities held are relatively large were the East Coast, down 19 percent; Indiana-Illinois-Kentucky, 18 percent; and the Texas Gulf, where there was a 34-percent shrinkage.

Year-end stocks of heavy fuel oils held at refineries, and representing about 79 percent of the total, increased 10 percent during 1954, while those at bulk plants and in pipelines were 9 percent lower at the year end. Year-end stocks represented about a 29-day supply at the following January daily rate of demand.

Shipments of residual fuel oils from the California refinery district totaled 21.7 million barrels. Most of this was exported to foreign countries (15.5 million barrels) or was shipped to Alaska and Hawaii (6.0 million barrels). Small quantities were distributed by rail and truck to other Western States (201 thousand barrels). There were no tanker shipments of residual fuel oil from California to the Atlantic Coast in 1952 or 1953; however, 1.6 million barrels was reported shipped in 1954 because of excessive stocks accumulated in the Pacific area and higher prices on the East Coast. Imports and other shipments of heavy fuel oils into the West Coast States increased 0.2 million barrels in 1954.

Tanker and barge shipments of residual fuel oil from the Gulf Coast to Atlantic ports decreased 9 percent in 1954. Quantities loaded at Texas terminals dropped 3.9 million barrels and those loaded in Louisiana 2.1 million barrels in 1954.

Heavy fuel oils moved by barge up the Mississippi River and its tributaries had increased 48 percent in 1953 but declined 16 percent in 1954. Barge shipments from Texas dropped 0.5 million barrels and those from Louisiana 0.7 million barrels. Arkansas and Mississippi were credited with 47,000 barrels. Barge shipments of heavy fuel oil to district 2 increased 0.5 million barrels, and those terminated in district 1 declined 1.1 million barrels. No barge shipments were reported to district 3.

Tanker rates for Bunker "C" fuel oil on the Gulf coast-New York Harbor fluctuated considerably in 1954; however, the average for the year was 30.6 cents a barrel which was only slightly less than the 1953 average of 31.5 cents. The rate of 30.8 cents a barrel in early January 1954 dropped to 20.8 cents on June 24. An upward trend in the second half of the year brought the rate to 49.4 cents a barrel on December 28, 1954.

There was a minor upward trend in representative prices for residual fuel oils in 1954. The posting for No. 6 grade at Oklahoma refineries intended for shipment to northern destinations was changed over 30 times during 1954. An early January price of $1.55 a barrel was reduced in mid-July to a "low" for the year of $1.05 a barrel. The upward trend, as the fall and winter demand became a factor, resulted in a price of $1.55 a barrel on December 30, 1954. The posting for No. 5 grade at New York Harbor was changed only twice in 1954; it declined from $2.77 a barrel to $2.73 in late March and increased to $2.87 during the first week in December. Bunker "C" heavy fuel oil at New York Harbor remained at $2.25 a barrel until late June 1954, when it was reduced to $2.20. It was increased to $2.25 a barrel in September and to $2.35 in early December. A price of $1.95 a barrel for Bunker "C" at New Orleans, La., dating from June 1953 continued unchanged during 1954, and similarly a quotation

TABLE 69.—Monthly average prices of residual fuel oil in the United States, 1953–54, in dollars per barrel

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1953													
No. 6 fuel oil at refineries, Oklahoma	1.03	1.01	1.00	1.00	1.00	1.10	1.19	1.20	1.21	1.26	1.37	1.49	1.15
No. 5 fuel oil at New York Harbor	2.58	2.55	2.55	2.61	2.62	2.67	2.77	2.77	2.77	2.77	2.77	2.77	2.68
Bunker "C" for ships:													
New York	2.05	2.00	2.00	2.08	2.10	2.14	2.25	2.25	2.25	2.25	2.25	2.25	2.16
New Orleans	1.60	1.60	1.60	1.68	1.70	1.77	1.95	1.95	1.95	1.95	1.95	1.95	1.80
San Pedro	1.70	1.73	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.79
1954													
No. 6 fuel oil at refineries, Oklahoma	1.54	1.51	1.39	1.27	1.21	1.13	1.08	1.15	1.20	1.34	1.42	1.47	1.31
No. 5 fuel oil at New York Harbor	2.77	2.77	2.76	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.85	2.75
Bunker "C" for ships:													
New York	2.25	2.25	2.25	2.25	2.25	2.24	2.20	2.20	2.21	2.25	2.25	2.33	2.24
New Orleans	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
San Pedro	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80

of $1.80 a barrel for this grade at San Pedro, Calif., which dated from February 1953, was also maintained throughout 1954.

LUBRICANTS

The total demand for lubricating oils and greases varies greatly from year to year. The quantity of new lubricants required for automotive use varies with the number of vehicles in operation, the age of the vehicles, the improvement in the quality of lubricants that has resulted in less frequent changes of oil and greasing, and the increasing practice of reclaiming lubricating oil for reuse. Industrial uses may vary with changes in total industrial activity. No figures are available on the relative demand by uses.

The total demand for lubricants amounted to 53.6 million barrels in 1954, which included exports of 15.2 million and a domestic demand of 38.4 million barrels.

TABLE 70.—Salient statistics of lubricants in the United States, 1953–54, by months and districts

Month and District	Production (thousand barrels)		Yield (percent)		Domestic demand (thousand barrels)		Stocks, end of period (thousand barrels)	
	1953	1954[1]	1953	1954[1]	1953	1954[1]	1953	1954[1]
By months:								
January	4,210	4,408	1.9	2.0	3,031	2,994	11,250	10,472
February	3,596	4,221	1.8	2.1	2,937	2,720	11,224	10,646
March	4,321	4,376	2.0	2.1	3,229	3,579	11,134	10,385
April	4,271	4,204	2.1	2.1	3,625	3,321	10,801	9,745
May	4,572	4,566	2.2	2.1	3,446	3,208	10,873	9,764
June	4,293	4,508	2.0	2.2	3,470	3,189	10,611	9,599
July	4,321	4,386	1.9	2.0	3,905	3,419	9,879	9,251
August	4,627	4,563	2.1	2.1	3,661	3,374	9,684	9,035
September	4,562	4,522	2.2	2.1	3,563	3,308	9,700	9,230
October	4,647	4,475	2.2	2.1	3,378	3,285	9,726	9,183
November	4,553	4,470	2.2	2.1	3,209	3,086	9,846	9,475
December	4,572	4,544	2.1	2.0	3,043	2,961	10,070	9,702
Total	52,545	53,243	2.1	2.1	40,497	38,444	10,070	9,702
By districts:								
East Coast	9,424	8,480	2.4	2.3	(2)	(2)	2,763	2,727
Appalachian	4,872	4,314	6.7	6.3			1,136	986
Indiana, Illinois, Kentucky, etc.	4,917	4,658	1.1	1.0			1,145	1,184
Oklahoma, Kansas, etc.	3,564	3,849	1.7	1.8			517	605
Texas Inland	145	144	.2	.2			18	12
Texas Gulf Coast	17,941	19,373	2.9	3.1			2,980	2,801
Louisiana Gulf Coast	4,939	5,401	2.4	2.6			475	495
Arkansas, Louisiana Inland, etc.	1,930	1,804	5.9	5.6			202	143
Rocky Mountain	199	220	.2	.2			97	112
California	4,614	5,000	1.2	1.3			737	637
Total	52,545	53,243	2.1	2.1	40,497	38,444	10,070	9,702

[1] Preliminary figures.
[2] Figures not available.

Production of lubricants has become less concentrated geographically, so that the relative production by refinery districts is of special interest. The important producing districts in 1954 were the Texas Gulf with 36.4 percent of the total, the East Coast with 15.9 percent, the Louisiana Gulf with 10.1 percent, the California with 9.4 percent, the Indiana-Illinois with 8.7 percent, the Appalachian with 8.1 percent, and the Oklahoma-Kansas with 7.2 percent. The largest gains in

TABLE 71.—Average monthly refinery prices of five selected grades of lubricating oil in the United States, 1953–54, in cents per gallon

[National Petroleum News]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1953													
Oklahoma:													
200 viscosity, No. 3 color, neutral	12.74	12.63	12.63	12.63	12.78	13.00	14.63	14.50	14.50	14.50	14.43	14.25	13.60
150–160 viscosity at 210°, bright stock, 10–25 pour test	22.22	21.46	21.24	21.00	20.48	19.75	21.14	20.77	20.75	20.75	20.62	19.88	20.84
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	27.58	26.00	26.00	26.00	25.77	25.17	25.00	25.00	25.00	23.26	22.80	22.50	25.00
600 steam-refined, cylinder stock, filterable	24.26	20.61	19.94	19.50	18.66	18.50	18.50	18.50	18.38	15.82	15.00	13.93	18.47
South Texas: 500 viscosity, No. 2½–3½ color, neutral	15.00	14.64	14.50	14.50	14.50	14.28	15.61	15.75	15.75	15.75	15.75	15.45	15.12
1954													
Oklahoma:													
200 viscosity, No. 3 color, neutral	14.25	14.25	14.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.50
150–160 viscosity at 210°, bright stock 10–25 pour test	18.98	18.50	18.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.79
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	20.77	20.00	20.00	20.00	19.81	17.45	17.00	17.00	17.00	17.00	17.00	17.00	18.34
600 steam-refined, cylinder stock, filterable	13.40	13.02	12.71	12.00	11.92	10.85	10.50	10.50	10.50	10.50	10.50	10.50	11.41
South Texas: 500 viscosity, No. 2½–3½ color, neutral	14.86	14.50	14.72	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.74

production in 1954 were in the Texas Gulf and Louisiana Gulf, where the increase in exports was a factor.

LIQUEFIED GASES

The sale of liquefied gases for fuel, chemical, motor-fuel, synthetic rubber, and other industrial uses has expanded rapidly and these gases now rank second to kerosine in total demand. Liquefied gases are derived from two sources, production from liquids recovered from natural gas at natural gasoline and allied plants and at oil refineries from the treatment of still gas. In 1954, 72 percent of total supply came from natural gas and 28 percent from oil refineries.

The total demand for liquefied gases amounted to 120.6 million barrels in 1954, including exports of 3.9 million and a domestic demand of 116.6 million. Sales data for 1954 indicate that about 51 percent of total domestic sales was for domestic and commercial fuel uses, 21 percent for chemicals, 11 percent for internal-combustion engines, 6 percent for synthetic rubber, and 11 percent for other uses.

JET FUELS

Data on jet fuels were first collected in 1952. At present, production is primarily for military aviation, although a small quantity is exported. Jet fuel has been replacing aviation gasoline in combat planes. Extension of its use to transport or commercial planes would drastically change the pattern of aviation-fuel consumption. Jet fuels are blended at the refineries from various amounts of low-grade gasoline, kerosine, and distillate fuel. In 1954, the average blend was 70.7 percent gasoline, 21.3 percent kerosine, and 8.0 percent distillate.

Total demand for jet fuels increased 33 percent in 1954 and totaled 46.0 million barrels, including exports of 0.2 million and a domestic demand of 45.8 million barrels.

OTHER PRODUCTS

Wax.—Wax is used primarily for waterproofing containers and paper and for candles. In 1954 the total demand for wax was 5.2 million barrels, including exports of 1.3 million and a domestic demand of 3.9 million (converted at the rate of 280 pounds to the barrel).

Coke.—Petroleum coke is a residue of cracking operations and is used for electrodes, refinery fuel, and domestic furnace fuel. Total demand was 23.0 million barrels in 1954, including exports of 3.3 million and a domestic demand of 19.7 million barrels (converted at the rate of 5.0 barrels to the short ton). Included in total production in 1954 was 9.5 million barrels (1.9 million tons) of nonmarketable catalyst coke that can be used only for refinery fuel. Since much of the increase in production has been of this low grade petroleum coke, some refineries now make coke from residual fuel oil to augment the marketable grades. Petroleum coke used as refinery fuel increased from 1.8 million short tons in 1953 to 1.9 million in 1954.

TABLE 72.—Salient statistics of wax in the United States, 1953–54, by types, months, and districts

(Thousand barrels)[1]

	Production						Domestic demand (all types)		Exports (all types)		Stocks, end of period					
	1953			1954[2]							1953			1954		
	Microcrystalline	Fully refined	Other	Microcrystalline	Fully refined	Other	1953	1954[2]	1953	1954[2]	Microcrystalline	Fully refined	Other	Microcrystalline	Fully refined	Other
By month:																
January	50	178	150	53	233	156	301	299	79	83	90	199	284	116	204	278
February	34	185	137	46	211	163	298	296	94	103	86	197	254	111	233	275
March	65	198	172	69	224	185	334	362	108	91	86	182	262	120	240	284
April	47	234	143	57	185	192	363	344	88	122	86	192	225	123	210	279
May	44	227	168	65	229	180	329	315	103	108	89	206	215	112	252	299
June	51	236	154	46	210	153	354	356	91	108	98	188	220	116	229	264
July	41	192	165	50	239	144	304	333	97	112	92	199	212	102	237	258
August	45	197	155	50	216	142	296	313	80	121	93	210	221	99	221	251
September	42	188	190	60	228	165	333	334	101	123	85	199	226	102	231	234
October	53	197	186	60	242	148	320	315	96	130	95	198	237	109	234	229
November	55	216	163	64	242	179	316	349	90	119	108	198	252	111	242	236
December	58	203	159	48	216	140	341	311	99	120	105	172	261	105	244	213
Total	585	2,451	1,942	668	2,675	1,947	3,889	3,927	1,126	1,340	105	172	261	105	244	213
By districts:																
East Coast	227	967	447	172	1,096	416	(3)	(3)	(3)	(3)	24	49	58	26	91	31
Appalachian	15	77	323	16	70	290					12	27	26	11	26	24
Indiana, Illinois, Kentucky, etc.	9	206	3	8	190	7					2	8	37	1	13	21
Oklahoma, Kansas, etc.	114	58	300	146	132	279					23	3	13	25	3	8
Texas Inland	94	-------	-------	167	-------	-------					18	-------	-------	13	-------	-------
Texas Gulf Coast	99	603	327	134	584	347					25	23	53	25	27	60
Louisiana Gulf Coast	22	143	533	23	104	602					1	6	33	3	10	38
Rocky Mountain	5	55	9	2	68	6					-------	10	41	1	10	31
California	-------	342	-------	-------	431	-------					-------	46	-------	-------	64	-------
Total	585	2,451	1,942	668	2,675	1,947	3,889	3,927	1,126	1,340	105	172	261	105	244	213

[1] Conversion factor: 280 pounds to the barrel.
[2] Preliminary figures.
[3] Figures not available.

TABLE 73.—Average monthly refinery prices of 124°–126° white crude scale wax at Pennsylvania refineries, 1950–53, in cents per pound

[National Petroleum News]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1950	4.24	3.63	3.63	3.63	3.59	3.50	3.51	3.80	4.35	4.94	5.52	6.58	4.24
1951	6.64	6.63	6.63	6.55	6.30	6.10	5.75	5.47	5.31	5.26	5.24	5.13	5.92
1952	4.83	4.73	4.40	4.38	4.35	4.25	4.14	4.12	3.93	3.88	3.82	3.81	4.22
1953	3.81	3.81	3.90	4.34	4.56	4.85	5.00	5.00	5.00	5.00	5.00	5.00	4.61
1954	5.00	5.00	5.05	5.13	5.16	5.44	5.45	5.45	5.45	5.45	5.45	5.45	5.29

TABLE 74.—Salient statistics of petroleum coke in the United States, 1953–54, by months and districts [1]

	Production (thousand barrels)		Yields (percent)		Domestic demand (thousand barrels)		Stocks, end of period (thousand barrels)	
	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]	1953	1954 [2]
By months:								
January	1,683	1,936	0.8	0.9	1,284	1,345	555	1,046
February	1,622	1,623	.8	.8	1,206	1,384	649	1,111
March	1,668	1,975	.8	.9	1,342	1,524	700	1,346
April	1,707	1,929	.8	.9	1,406	1,508	769	1,494
May	1,850	1,897	.9	.9	1,404	1,418	948	1,657
June	1,752	1,857	.8	.9	1,524	1,473	775	1,774
July	1,869	2,102	.8	1.0	1,666	1,650	705	1,918
August	1,920	2,061	.9	1.0	1,492	1,758	769	1,973
September	1,885	2,049	.9	1.0	1,593	1,796	781	2,009
October	1,821	2,282	.8	1.1	1,666	1,777	603	2,118
November	1,900	2,220	.9	1.1	1,622	2,145	686	1,974
December	1,930	2,353	.9	1.0	1,394	1,984	860	2,107
Total	21,607	24,284	.8	1.0	17,599	19,762	860	2,107
By districts:								
East Coast	1,515	1,491	.4	.4	(3)	(3)	------	--------
Appalachian	285	301	.4	.4			3	--------
Indiana, Illinois, Kentucky, etc	9,267	9,947	2.0	2.1			541	1,382
Oklahoma, Kansas, etc	2,508	3,292	1.2	1.5			121	388
Texas Inland	339	644	.4	.7			29	79
Texas Gulf Coast	1,788	2,270	.3	.4			2	--------
Louisiana Gulf Coast	1,681	1,882	.8	.9			13	20
Arkansas, Louisiana Inland	874	820	2.8	2.6			54	--------
Rocky Mountain	1,165	1,073	1.3	1.1			61	131
California	2,185	2,564	.6	.7			36	107
Total	21,607	24,284	.8	1.0	17,599	19,762	860	2,107

[1] Conversion factor: 5 barrels to the short ton.
[2] Preliminary figures.
[3] Figures not available.

Still Gas.—The production of still gas increased from the equivalent of 102.2 million barrels in 1953 to 102.6 million in 1954, or from 480 to 494 billion cubic feet. The conversion from cubic feet, as reported, to barrels is in terms of the crude-oil equivalent, not on the basis of actual heating value. Most of the still gas is consumed as refinery fuel.

TABLE 75.—Production of still gas in the United States, 1952–54, by districts [1]

District	1952		1953		1954 [2]	
	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels
East Coast	46, 404	12, 890	56, 733	13, 057	60, 464	12, 694
Appalachian	14, 015	3, 893	15, 803	4, 204	14, 235	3, 679
Indiana, Illinois, Kentucky, etc	78, 448	21, 791	94, 354	22, 753	98, 370	21, 891
Oklahoma, Kansas, etc	25, 193	6, 998	30, 730	6, 887	31, 631	7, 313
Texas Inland	15, 242	4, 234	21, 928	4, 848	20, 411	4, 647
Texas Gulf Coast	82, 879	23, 022	131, 875	26, 133	135, 923	26, 425
Louisiana Gulf Coast	16, 693	4, 637	32, 709	5, 729	35, 030	6, 251
Arkansas, Louisiana Inland, etc	3, 809	1, 058	5, 448	1, 115	6, 220	1, 402
Rocky Mountain	12, 215	3, 393	15, 707	3, 648	15, 503	3, 547
California	48, 092	13, 359	74, 358	13, 869	76, 703	14, 703
Total	342, 990	95, 275	479, 645	102, 243	494, 490	102, 552

[1] Conversion factor: 3,600 cubic feet to the barrel.
[2] Preliminary figures.

Asphalt and Road Oil.—These products are used primarily in building materials and in road construction. In 1954 total demand for asphalt amounted to 78.5 million barrels, including exports of 1.9 million and a domestic demand of 76.6 million barrels (converted at the rate of 5.5 barrels to the short ton). The gain in domestic demand, compared to 1953, was 6 percent. The demand for road oil amounted to 7.2 million barrels in 1954. Sales of asphalt and types of products are reported in the Asphalt Chapter of the Minerals Yearbook.

Miscellaneous Oils.—The total demand for miscellaneous oils rose from 9.1 million barrels in 1953 to 10.8 million in 1954. The largest increases in production relate to specialties and others, including spray oils, aromatic tar, petrochemicals, xylene, and other products.

TABLE 76.—Production of miscellaneous finished oils in the United States in 1954 by districts and classes

(Thousand barrels)

District	Petrolatum [1]	Absorption oil	Medicinal oil	Specialties oils	Solvents	Other	Total
East coast	37	--------	31	1, 089	131	--------	1, 288
Appalachian	160	--------	42	48	--------	2	252
Indiana, Illinois, Kentucky, etc	175	--------	--------	789	--------	234	1, 198
Oklahoma, Kansas, etc	372	165	--------	118	--------	--------	655
Texas Inland	--------	1, 426	--------	--------	--------	316	1, 742
Texas Gulf Coast	171	43	--------	372	--------	769	1, 355
Louisiana Gulf Coast	4	148	--------	1, 189	--------	--------	1, 341
Arkansas, Louisiana Inland, etc	60	895	--------	3	95	--------	1, 053
Rocky Mountain	--------	--------	--------	2	--------	87	89
California	--------	17	40	601	196	1, 186	2, 040
Total	979	2, 694	113	4, 211	422	2, 594	11, 013

[1] Conversion factor: 300 pounds to the barrel.

TABLE 77.—**Mineral oils, crude and refined, shipped commercially from Gulf Coast to East Coast ports of the United States, 1953–54, by classes** [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Crude petroleum	14, 988	12, 588	15, 251	14, 096	15, 678	15, 457	16, 899	15, 066	13, 905	13, 534	13, 493	15, 836	176, 791
Gasoline	14, 524	13, 555	14, 208	16, 543	16, 618	16, 573	17, 226	17, 183	16, 047	16, 868	15, 012	14, 662	189, 019
Kerosine	4, 716	3, 709	3, 868	2, 206	2, 573	2, 180	3, 289	2, 706	2, 266	3, 462	3, 489	4, 466	38, 930
Distillate fuel oil	17, 440	10, 814	10, 976	10, 087	9, 350	8, 277	8, 399	9, 318	9, 922	10, 239	11, 418	15, 493	131, 733
Residual fuel oil	5, 204	5, 440	5, 119	5, 075	6, 804	5, 277	4, 500	5, 670	5, 241	4, 429	4, 872	6, 245	63, 876
Lubricating oils	577	714	668	589	727	593	642	721	735	638	465	834	7, 903
Miscellaneous oils	1, 338	1, 200	1, 213	901	1, 017	1, 093	953	832	712	1, 259	1, 035	1, 112	12, 665
Total	58, 787	48, 020	51, 303	49, 497	52, 767	49, 450	51, 908	51, 496	48, 828	50, 429	49, 784	58, 648	620, 917
1954													
Crude petroleum	14, 080	13, 800	14, 804	14, 575	13, 880	13, 024	12, 224	12, 524	12, 284	13, 956	13, 330	13, 799	162, 280
Gasoline	14, 248	13, 223	17, 291	18, 357	16, 923	16, 964	15, 611	17, 707	15, 748	17, 891	15, 549	15, 960	195, 472
Kerosine	3, 996	4, 036	3, 762	2, 797	2, 418	3, 196	3, 155	2, 931	2, 544	3, 095	3, 792	5, 725	41, 447
Distillate fuel oil	16, 845	15, 041	11, 767	10, 366	9, 419	8, 516	9, 017	10, 600	10, 353	12, 842	12, 783	17, 964	145, 513
Residual fuel oil	5, 362	5, 181	5, 628	5, 251	4, 954	3, 919	3, 753	4, 283	4, 421	5, 875	4, 559	4, 683	57, 869
Lubricating oils	602	539	578	668	785	806	598	747	497	705	680	779	7, 984
Miscellaneous oils	857	902	1, 347	1, 522	1, 935	1, 251	1, 088	840	614	978	1, 031	668	13, 033
Total	55, 990	52, 722	55, 177	53, 536	50, 314	47, 676	45, 446	49, 632	46, 461	55, 342	51, 724	59, 578	623, 598

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[1] Oil and Gas Division, U. S. Department of the Interior.

INTERCOASTAL SHIPMENTS

The major intercoastal movement of crude oil and products was from Gulf-coast ports to east-coast ports. The comparatively small movement of products from California to the east coast increased from 0.7 million barrels in 1953 to 2.5 million in 1954, the increase being due primarily to the gain of 1.6 million barrels in residual fuel oil shipments.

Total Gulf-east-coast shipments amounted to 623.6 million barrels in 1954, a gain of 2.7 million including a decline of 14.5 million in crude oil and an increase of 17.2 million in products. The principal changes by products, compared with 1953, were increases of 13.8 million barrels for distillate, 6.5 million for gasoline, and 2.5 million for kerosine, while residual shipments declined 6.0 million barrels. The decline in the movement of domestic crude oil was related to a decline in total crude runs in the East Coast district combined with an increase in foreign crude runs. The increase in the product movement reflected the improved demand for light heating oils and a sharp drop in residual fuel demand.

FOREIGN TRADE [3]

Foreign trade statistics in this section, as reported by the United States Department of Commerce, differ slightly from those used in other sections of this chapter. Bureau of Mines petroleum import statistics pertain to continental United States only, and its export statistics include not only foreign countries but also shipments to the Territories. Imports of crude petroleum and unfinished oils shown in table 78 are obtained by the Bureau of Mines from petroleum companies on a custody basis to balance refinery reports and therefore differ from the totals reported by the United States Department of Commerce.

Imports.—During 1954 mineral-oil imports into continental United States continued the growth trend of the postwar years and increased about 2 percent over 1953 to average 1.1 million barrels per day. Crude oil and residual fuel oil continued to be the principal oils imported, with crude petroleum amounting to 62 percent of total petroleum imports and residual fuel oil 34 percent of the total. Imported mineral oils made up 13.0 percent of the total new United States supply of petroleum in 1954 compared with 12.7 percent a year ago. The volume of imported mineral oil exceeded exports, including shipments to the Territories, by 253.9 million barrels in 1954 compared with 230.9 million barrels in 1953.

According to United States Department of Commerce statistics, crude-petroleum imports increased 2 percent over 1953. Venezuela was again the largest supplier of crude petroleum to the United States (53 percent of the total), and receipts from that source rose 9 million barrels. The countries of the Middle East supplied 32 percent of United States crude imports compared with 34 percent the previous year. Receipts from Saudi Arabia were 18 percent lower, while those from Kuwait and Iraq rose 8 and 39 percent, respectively. Receipts of Indonesian crude oils were off slightly from 1953. Imports of crude petroleum from Canada were at the same rate as in 1953.

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[3] By F. X. Jordan, Office of Oil and Gas, U. S. Department of the Interior.

Lower United States industrial demand for heavy fuel oil in 1954 resulted in a 2-percent decrease in imports of residual fuel oil used as boiler fuel by industry. The Caribbean area (namely, the Netherlands Antilles and Venezuela) continued to supply the bulk of United States imports of this heavy fuel oil; Mexico shipped most of the balance.

Imports of the lighter heating oils and diesel fuels into the continental United States decreased 4 percent, and imports into the Territories from foreign countries rose 59 percent. Refineries in the Caribbean area continued to be the primary source for these imported distillate fuel oils; the balance was supplied from the Middle East—Bahrein Island and Saudi Arabia.

Asphalt imports, including receipts by the Territories, were 34 percent higher than in 1953; the Netherlands Antilles was the major supplier in both years.

Imports of unfinished oils for further processing almost tripled the 1953 rate. Mexico and Kuwait, neither of which supplied unfinished oils in 1953, shipped 5 and 0.7 million barrels, respectively. Receipts of unfinished oil from Venezuela were up 85 percent, while Trinidad's shipments of unfinished oils to the United States fell 93 percent.

Exports.—United States exports of crude petroleum and refined petroleum products, including shipments to the Territories, decreased 11 percent in 1954 as foreign refinery capacity continued to increase, supplying more of the foreign refined-product requirements. New petroleum refineries in Europe, Aden, India, Union of South Africa, and Australia, among others, began supplying products to local markets and, in the case of the Aden refinery, began exporting large volumes of refined products. The Abadan, Iran, plant, which produces primarily for the export market, resumed operations on a limited scale in late October 1954 and will supply increasing volumes of product for export as refinery throughout is increased.

Crude-petroleum exports from the United States were 32 percent lower and total refined-product exports 8 percent less than in 1953. Exports (including shipments to the Territories) of residual fuel oil, lubricating oil, wax, asphalt, and liquefied petroleum gases, were higher in 1954, while exports of other refined products were lower than the previous year.

In 1954 crude-petroleum exports to all countries were lower except for nominal increases to Cuba, France, and United Kingdom. Shipments to Canada dropped almost 6 million barrels as the Canadian transmountain pipeline from Alberta to British Columbia completed its first full year of operation, enabling refineries on the Canadian west coast to operate on Canadian crude rather than United States supplies. Argentina's imports of United States crude decreased 44 percent; Italy took 66 percent less and Japan 16 percent less than in 1953. None was shipped to the Territories.

Continental United States exports and Territorial shipments of motor fuel (including aviation gasoline) decreased 3.6 million barrels. Country destinations of certain grades of aviation gasoline are not available for security reasons, but the amounts are included in the grand total. The limited country breakdown available indicates that smaller shipments were made to all major geographical areas, including the Territories. The largest decreases were in shipments to Canada, Cuba, the United Kingdom, Australia, and New Zealand. The Netherlands Antilles and Mexico were the only countries taking significantly larger quantities than in 1953.

Exports of kerosine dropped one-third from 1953, principally because of curtailed shipments to Egypt and India. Shipments to Mexico, Puerto Rico, Argentina, the United Kingdom, and Australia increased moderately.

Exports of distillate fuel oil were off 25 percent from 1953 with exports generally lower to all areas except South America. The largest decreases were: Netherlands Antilles, down 3.3 million barrels; United Kingdom, 1.1 million; Sweden, 1.2 million; and Aden, Arabia, 0.7 million barrels less than in 1953. The only increase of consequence was the 2.0-million-barrel increase in shipments to Mexico. Territory shipments were 15 percent under the level of the previous year.

According to United States Department of Commerce statistics, exports and Territorial shipments of residual fuel oil were slightly above the previous year. North American countries increased takings of residual fuel oil by 0.6 million barrels, and Chile took 0.9 million barrels more than in 1953. Japan, however, took 1.4 million barrels less, and the Territories 0.2 million less than in 1953.

Lubricating-oil shipments increased 18 percent over 1953. The destinations for certain grades of lubricating oil are not available for security reasons, but the quantities are included in the grand totals. The limited breakdown available indicates that shipments to Eastern Hemisphere countries generally increased, and Asia received 33 percent, Europe 15 percent, Africa 45 percent, and Oceania 186 percent more than in 1953. In Europe, the largest foreign market for lubricants, all countries increased imports of United States lubricants except France and the United Kingdom. India, Pakistan, Egypt, and Union of South Africa also increased imports notably, as did Australia and New Zealand. Territory receipts from the United States were off 12 percent. Total shipments to Western Hemisphere destinations were at the 1953 rates, with reduced shipments to Canada and Argentina and higher imports by Mexico and Brazil.

Among the other refined petroleum products, asphalt exports rose 9 percent. Higher shipments to Western Hemisphere countries and to Indochina more than offset the decline in shipments to Africa. Liquefied-petroleum-gas exports increased 32 percent, with notable gains in shipments to Mexico and Brazil. Exports of wax and petrolatum increased 19 and 20 percent, respectively. Petroleum-coke exports decreased 11 percent. Shipments to Japan fell 0.4 million barrels, which more than offset increases in shipment to France and Italy. Shipments of miscellaneous oils, including jet fuel, were slightly higher in 1954. Destinations of jet-fuel exports are not available for security reasons, but the quantities are included in the grand totals.

TABLE 78.—Mineral oils, crude and refined, imported into continental United States, 1953–54,[1] by months

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Crude petroleum	19,098	16,400	20,320	18,839	21,677	21,207	19,513	20,847	20,757	19,806	19,444	18,547	236,455
Refined products:													
Gasoline	4	8	141	9	7	142	4	2	2	3	135	2	459
Distillate fuel oil	285	507	394	319	136	112	507	423	231	71	177	217	3,379
Residual fuel oil	15,424	11,958	12,898	10,307	10,846	9,241	8,239	6,794	8,419	9,866	12,645	14,896	131,533
Asphalt	170	127	162	235	171	259	241	323	187	174	170	283	2,502
Unfinished oils	70	166	329	184	282	171	173	268	267	340	548	373	3,171
Total	35,051	29,166	34,244	29,893	33,119	31,132	28,677	28,657	29,863	30,260	33,119	34,318	377,499
1954[2]													
Crude petroleum	19,141	17,395	20,260	17,229	21,957	18,728	22,448	20,589	20,168	19,893	19,082	22,589	239,479
Refined products:													
Gasoline	2	2	1	1	2	133	133	4	15	530	198	164	1,185
Distillate fuel oil	156	159	236	317	262	306	199	461	251	299	163	386	3,195
Residual fuel oil	13,815	13,217	12,033	9,748	8,143	9,212	7,860	7,283	8,206	10,546	12,622	16,324	129,009
Lubricant	---	---	---	---	---	---	---	---	---	---	---	1	1
Wax	---	---	---	---	---	1	---	---	---	---	---	---	1
Asphalt	148	237	193	194	284	346	309	402	468	343	299	240	3,463
Unfinished oils	694	619	741	622	509	751	707	499	409	671	718	636	7,576
Total	33,956	31,629	33,464	28,111	31,157	29,477	31,656	29,238	29,517	32,282	33,082	40,340	383,909

[1] Imports of crude reported to Bureau of Mines; imports of refined products compiled from records of U. S. Department of Commerce; figures may differ slightly from those used in other sections of this chapter.

[2] Preliminary figures.

TABLE 79.—Crude petroleum and petroleum products imported for consumption into continental United States, 1953–54, by country, in thousand barrels [1]

[U. S. Department of Commerce]

Country	Crude petroleum	Gasoline [2]	Kerosine	Distillate oil [3]	Residual oil [4]	Asphalt	Unfinished oil	Miscellaneous oils	Total
1953									
North America:									
Canada	2,650	58	(5)	3	147	(5)	150	1	3,009
Leeward and Windward Islands	------	------	------	------	33	------	------	------	33
Mexico	4,342	------	------	8	7,422	------	------	------	11,772
Netherlands Antilles	------	440	------	[6] 2,305	[6] 85,489	2,490	[6] 3	------	[6] 90,727
Trinidad and Tobago	------	------	------	1	2,380	13	1,569	------	3,963
Total North America	6,992	498	(5)	[6] 2,317	[6] 95,471	2,503	[6] 1,722	1	[6] 109,504
South America:									
Colombia	15,200	------	------	------	434	------	------	------	15,634
Ecuador	90	------	------	------	------	------	------	------	90
Venezuela	[6] 120,755	------	------	[6] 616	[6] 37,959	45	[6] 1,200	------	160,575
Total South America	[6] 136,045	------	------	[6] 616	[6] 38,393	45	[6] 1,200	------	176,299
Europe:									
France	------	------	------	------	488	------	------	(5)	488
Germany, West	------	------	------	------	------	(5)	------	(5)	(5)
Italy	------	------	------	------	[6] 207	------	------	------	[6] 207
Netherlands	------	------	------	------	------	2	------	(5)	2
Switzerland	------	(5)	------	------	------	------	------	(5)	(5)
United Kingdom	------	(5)	(5)	------	(5)	(5)	------	(5)	(5)
Total Europe	------	(5)	(5)	------	[6] 695	2	------	(5)	[6] 697
Asia:									
Bahrein	------	5	------	246	------	------	------	------	251
Indonesia	14,426	------	------	------	------	------	------	------	14,426
Iraq	1,576	------	------	------	------	------	------	------	1,576
Japan	------	------	------	------	9	------	------	------	9
Kuwait	38,569	------	------	------	------	------	------	------	38,569
Qatar [7]	3,150	------	------	------	------	------	------	------	3,150
Saudi Arabia	37,150	84	------	826	256	------	------	------	38,316
Total Asia	94,871	89	------	1,072	265	------	------	------	96,297
Oceania: Australia	------	------	------	------	------	------	------	(5)	(5)
Grand total	[6] 237,908	587	(5)	[6] 4,005	[6] 134,824	2,550	[6] 2,922	1	[6] 382,797
Imports into United States Territories and possessions from foreign countries:									
Alaska	------	5	------	------	------	------	------	------	5
Hawaii	------	89	------	646	106	------	------	------	841
Puerto Rico	------	35	------	24	3,323	46	------	------	3,428
Total	------	129	------	670	3,429	46	------	------	4,274
Total net imports into continental United States	[6] 237,908	458	(5)	[6] 3,335	[6] 131,395	2,504	[6] 2,922	1	[6] 378,523
1954									
North America:									
Canada	2,606	117	------	5	103	2	1	3	2,837
Mexico	5,037	------	------	3	9,747	------	5,231	------	20,018
Netherlands Antilles	------	1,220	------	2,505	79,391	3,378	------	------	86,494
Trinidad and Tobago	459	12	------	------	429	23	104	------	1,027
Total North America	8,102	1,349	------	2,513	89,670	3,403	5,336	3	110,376

See footnotes at end of table.

TABLE 79.—Crude petroleum and petroleum products imported for consumption into continental United States, 1953–54, by country, in thousand barrels [1]—Con.

[U. S. Department of Commerce]

Country	Crude petroleum	Gasoline [2]	Kerosine	Distillate oil [3]	Residual oil [4]	Asphalt	Unfinished oil	Miscellaneous oils	Total
South America:									
Colombia	12,655	------	------	------	------	------	------	------	12,655
Ecuador	300	------	------	------	------	------	------	------	300
Peru	609	------	------	------	------	------	------	------	609
Venezuela	129,737	------	------	517	42,494	17	2,220	------	174,985
Total South America	143,301	------	------	517	42,494	17	2,220	------	188,549
Europe:									
Azores	------	------	------	(5)	------	------	------	------	(5)
France	------	------	------	------	113	------	------	------	113
Germany, West	------	------	------	------	------	(5)	------	(5)	(5)
Netherlands	------	------	------	------	------	(5)	------	------	(5)
United Kingdom	------	------	------	------	------	------	------	1	1
Total Europe	------	------	------	(5)	113	(5)	------	1	114
Asia:									
Bahrein	------	------	------	108	------	------	------	------	108
Hong Kong	------	------	------	------	3	------	------	------	3
Indonesia	13,828	------	------	------	------	------	------	------	13,828
Iran	208	------	------	------	------	------	------	------	208
Iraq	2,188	------	------	------	------	------	------	------	2,188
Japan	------	------	------	------	3	------	------	------	3
Kuwait	41,842	------	------			------	701	------	42,543
Qatar [7]	2,751	------	------	------	------	------	------	------	2,751
Saudia Arabia	30,311	(5)	(5)	1,120	------	------	------	------	31,431
Total Aisa	91,128	(5)	(5)	1,228	6	------	701	------	93,063
Grand total	242,531	1,349	(5)	4,258	132,283	3,420	8,257	4	392,102
Imports into United States Territories and possessions from foreign countries:									
Alaska	------	137	------	------	------	(5)	------	------	137
Hawaii	------	------	------	1,063	------	------	------	------	1,063
Puerto Rico	------	27	------	------	3,159	27	------	------	3,213
Total	------	164	------	1,063	3,159	27	------	------	4,413
Total net imports into continental United States	242,531	1,185	(5)	3,195	129,124	3,393	8,257	4	387,689

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[1] Compiled by M. B. Price and E. D. Page, of the Bureau of Mines, from records of the U. S. Department of Commerce.

[2] Includes naphtha but excludes benzol (thousand barrels: 1953—490, 1954—291.

[3] Includes quantities imported free of duty for supplies of vessels and aircraft.

[4] Includes quantities imported free for manufacture in bond and export, and for supplies of vessels and aircraft.

[5] Less than 1,000 barrels.

[6] Revised figure.

[7] Assumed source; classified in import statistics under "Arabia Peninsular States, n. e. c."

TABLE 80.—Mineral oils, crude and refined, shipped from continental United States, including shipments to Territories and possessions, 1953–54, by class and month [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1953													
Crude petroleum	2.211	2,011	2,171	2,833	1,611	1,824	1,232	1,321	1,109	1,178	1,052	1,378	19,931
Refined products:													
Gasoline [2]	3,175	3,218	3,117	4,066	2,865	2,634	3,393	3,004	3,625	2,628	3,134	3,066	37,925
Kerosine	386	520	800	915	567	958	494	446	544	397	523	715	7.265
Distillate fuel oil	2,349	3,764	3,330	3,136	2,928	3,007	2,401	1.640	2,199	2,591	2,273	2,710	32,328
Residual fuel oil	1,839	1,953	2,350	2,366	2,059	2,117	1,765	2,385	2,254	2,580	2,341	1,982	25,991
Jet fuel	13			44		139	93		119	1			409
Lubricants	950	685	1,182	979	1,054	1,085	1,148	1,161	983	1,243	1,224	1,305	12,999
Paraffin wax	79	94	108	88	103	91	97	80	101	96	90	99	1,126
Coke	357	322	275	232	207	401	273	364	280	333	195	362	3,661
Asphalt	247	202	157	229	128	164	114	59	69	96	86	159	1,710
Liquefied gases	224	243	228	251	267	242	229	290	258	217	222	331	3,002
Miscellaneous oils	17	12	20	21	22	24	22	21	18	18	24	25	244
Total refined	9,636	11,013	11,567	12,827	10.260	10,862	10,029	9,450	10,450	10,200	10,112	10,754	126,660
Total crude and refined	11,847	13,024	13,738	15,160	11,871	12,686	11,261	10,771	11,559	11,378	11,164	12,132	146,591
1954 [3]													
Crude petroleum	1,588	795	873	1,418	1,258	1,372	1,073	1,349	509	1,485	1,047	797	13,564
Refined products:													
Gasoline [2]	2,691	2,880	1,717	2,546	2,936	3,779	3,189	2,873	2,886	3,345	2,758	2,863	34,463
Kerosine	470	690	603	649	253	348	467	165	313	294	464	187	4,903
Distillate fuel oil	1,780	1.468	1,652	2,114	2,176	2,430	2,018	1,546	1,646	2,342	2,911	2,118	24,201
Residual fuel oil	1,770	2,104	2,792	2,203	2,619	2,408	2,386	2,077	1,982	1,869	2,301	2,345	26,856
Jet fuel		3	14	50	2	2	78						149
Lubricants	1,012	1,327	1.058	1,523	1,339	1,484	1,315	1,405	1,019	1,237	1,092	1,357	15,168
Paraffin wax	83	103	91	122	108	108	112	121	123	130	119	120	1,340
Coke	405	174	216	273	316	267	308	248	217	396	219	236	3,275
Asphalt	80	53	264	224	251	192	243	107	101	122	92	142	1,871
Liquefied gases	270	339	383	355	290	330	301	324	310	336	297	404	3,939
Miscellaneous oils	16	29	14	32	29	22	26	25	19	23	27	30	292
Total refined	8,577	9,170	8,804	10,091	10,319	11,370	10,443	8,891	8,616	10,094	10,280	9,802	116,457
Total crude and refined	10,165	9,965	9,677	11,509	11,577	12,742	11,516	10,240	9,125	11,579	11,327	10,599	130,021

[1] Compiled from records of the U. S. Department of Commerce, except Alaska and Hawaii, which are Bureau of Mines data; figures may differ slightly from those used in other sections of this chapter.

[2] Includes benzol, naphtha, natural gasoline, and antiknock compounds.

[3] Preliminary figures.

TABLE 81.—Crude petroleum and petroleum products exported from continental United States, 1953–54, by country of destination, and shipments to and exports from Territories and possessions in thousand barrels [1]

[U. S. Department of Commerce]

Country	Crude petroleum	Gasoline [2] [3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [3]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [3]	Total
1953													
North America													
Canada	14,025	6,366	776	9,915	5,798	748	70	1,330	118	1,752	12	54	40,964
Canal Zone	----------	221	27	140	110	3	15	(4)	(4)	----------	(4)	(4)	516
Costa Rica	----------	57	9	19	9	6	6	(4)	6	----------	(4)	1	113
Cuba	2,620	1,645	(4)	407	1,342	59	2	112	23	----------	2	8	6,220
Mexico	(4)	3,119	116	421	2,692	293	112	1,174	321	(4)	6	27	8,281
Netherlands Antilles	----------	256	----------	5,037	----------	25	1	(4)	----------	----------	(4)	(4)	5,319
Other North America	(4)	66	26	151	450	44	21	31	44	----------	5	13	851
Total North America	16,645	11,730	954	16,090	10,401	1,178	227	2,647	512	1,752	25	103	62,264
South America:													
Argentina	1,081	(4)	----------	191	----------	266	(4)	(4)	(4)	----------	----------	(4)	1,538
Brazil	----------	138	75	50	----------	466	93	295	22	18	2	7	1,166
Chile	----------	101	(4)	48	1,005	58	25	(4)	42	----------	1	6	1,286
Colombia	----------	18	5	10	----------	31	61	(4)	170	----------	2	6	303
Uruguay	----------	4	----------	----------	----------	14	----------	(4)	(4)	----------	1	2	21
Venezuela	----------	5	----------	----------	----------	40	5	(4)	29	----------	2	24	105
Other South America	----------	2	3	25	48	37	8	(4)	41	----------	2	11	177
Total South America	1,081	268	83	324	1,053	912	192	295	304	18	10	56	4,596
Europe:													
Belgium-Luxembourg	----------	240	1	853	32	479	1	(4)	13	----------	6	7	1,632
Denmark	----------	26	(4)	51	----------	94	(4)	(4)	1	(4)	1	1	174
France	498	(4)	(4)	(4)	2	81	(4)	(4)	52	211	9	4	857
Germany, West	----------	4	1	578	----------	148	1	(4)	4	----------	9	6	751
Italy	314	64	(4)	(4)	----------	172	1	(4)	47	152	10	9	769
Netherlands	----------	(4)	1	292	----------	249	(4)	(4)	8	----------	4	12	566
Norway	----------	45	32	659	----------	49	(4)	(4)	2	219	1	4	1,011
Sweden	----------	188	16	1,374	38	166	(4)	----------	3	37	1	5	1,828
Switzerland	----------	80	1	24	----------	42	5	----------	6	3	2	3	166
Turkey	----------	13	18	----------	----------	151	9	----------	----------	----------	2	7	200
United Kingdom	418	837	190	5,701	402	1,963	(4)	(4)	38	(4)	69	1	9,619
Other Europe	114	55	34	145	----------	285	2	(4)	31	97	8	10	781
Total Europe	1,344	1,552	294	9,677	474	3,879	19	(4)	205	719	122	69	18,354

See footnotes at end of table.

TABLE 81.—Crude petroleum and petroleum products exported from continental United States, 1953–54, by country of destination and shipments to and exports from Territories and possessions in thousand barrels [1]—Continued

[U. S. Department of Commerce]

Country	Crude petroleum	Gasoline [2] [3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [3]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [3]	Total
Asia:													
Aden	----------	----------	----------	751	----------	1	----------	----------	----------	----------	----------	(4)	752
India	----------	161	2,692	388	----------	341	66	(4)	(4)	(4)	4	4	3,656
Indochina	----------	4	----------	----------	----------	50	116	----------	(4)	----------	2	5	177
Indonesia	----------	(4)	(4)	(4)	----------	31	120	(4)	2	----------	14	5	172
Japan	862	757	(4)	627	7,715	75	14	(4)	24	1,033	22	241	11,370
Pakistan	----------	(4)	93	83	----------	20	158	----------	----------	----------	1	1	356
Philippines	----------	130	1	4	----------	129	145	6	39	----------	4	11	469
Other Asia	----------	10	185	----------	38	228	163	(4)	29	44	11	25	733
Total Asia	862	1,062	2,971	1,853	7,753	875	782	6	94	1,077	58	292	17,685
Africa:													
Belgian Congo	----------	82	32	31	14	40	50	----------	(4)	----------	(4)	5	254
Egypt	----------	(4)	1,929	394	----------	75	----------	----------	(4)	----------	2	3	2,408
French West Africa	----------	2	11	18	25	17	1	----------	(4)	----------	(4)	5	79
Mozambique	----------	287	----------	----------	----------	8	10	(4)	(4)	----------	1	1	307
Union of South Africa	----------	397	(4)	290	----------	172	106	4	8	(4)	18	20	1,015
Other Africa	----------	142	134	364	74	121	127	(4)	2	----------	(4)	21	985
Total Africa	----------	910	2,106	1,097	113	433	294	4	10	(4)	21	55	5,043
Oceania:													
Australia	----------	790	1	400	----------	184	(4)	----------	1	46	7	1	1,430
New Zealand	----------	647	(4)	204	----------	43	11	2	1	----------	1	(4)	909
Other Oceania	----------	42	9	16	16	2	(4)	1	----------	----------	----------	(4)	86
Total Oceania	----------	1,479	10	620	16	229	11	3	2	46	8	1	2,425
Grand total	19,932	[5] 30,045	6,418	29,661	19,810	12,258	1,525	2,955	1,127	3,612	244	986	[5] 128,573
Shipments from continental United States to Territories and possessions:													
Alaska and Hawaii [6]	----------	4,727	167	2,640	6,144	140	86	47	(7)	49	(7)	----------	14,000
Puerto Rico	(7)	2,756	674	281	(7)	60	91	(7)	(7)	(7)	(7)	4	3,866
Wake	(7)	425	(4)	21	(7)	(4)	(4)	(7)	(7)	(7)	(7)	(4)	446
Other	(7)	81	14	42	(7)	5	6	(7)	(7)	(7)	(7)	(4)	148
Total	----------	7.989	855	2,984	6,144	205	183	47	(7)	49	(7)	4	18,460

Exports from noncontiguous Territories and possessions to foreign countries:													
Alaska	--------	111	7	235	6	1	--------	--------	--------	--------	--------	(4)	360
Other	--------	1	2	82	--------	(4)	--------	--------	(4)	--------	--------	(4)	85
Total	--------	112	9	317	6	1	--------	--------	(4)	--------	--------	(4)	445
Total net shipments from continental United States	19,932	[6] 37,922	7,264	32,328	25,948	12,462	1,708	3,002	1,127	3,661	244	990	[6] 146,588
1954													
North America:													
Canada	8,130	2,583	551	9,658	5,755	621	193	1,389	94	1,712	10	69	30,765
Canal Zone	--------	64	23	196	154	5	11	--------	(4)	--------	(4)	1	454
Costa Rica	--------	42	4	52	10	8	11	(4)	6	--------	(4)	1	134
Cuba	2,928	915	(4)	229	1,371	72	7	140	22	--------	2	16	5,702
Mexico	--------	4,182	267	2,427	2,585	344	82	1,738	337	(4)	6	35	12,003
Netherlands Antilles	--------	516	--------	1,709	288	10	(4)	--------	--------	--------	(4)	1	2,524
Other North America	--------	185	19	69	881	64	17	38	56	(4)	4	16	1,299
Total North America	11,058	8,437	864	14,340	11,044	1,124	321	3,305	515	1,712	22	139	52,881
South America:													
Argentina	608	(4)	128	235	--------	120	(4)	(4)	(4)	16	--------	1	1,108
Brazil	--------	133	44	100	--------	618	111	587	98	4	21	13	1,729
Chile	--------	6	(4)	68	1,895	70	42	(4)	19	--------	(4)	6	2,106
Colombia	--------	1	(4)	--------	--------	41	91	2	166	--------	2	9	312
Uruguay	--------	2	--------	--------	--------	21	4	(4)	1	--------	(4)	5	33
Other South America	--------	17	1	20	24	84	58	1	90	--------	4	40	339
Total South America	608	159	173	423	1,919	954	306	590	374	20	27	74	5,627
Europe:													
Belgium-Luxembourg	--------	10	1	172	--------	739	4	(4)	15	6	6	10	963
Denmark	--------	2	1	--------	--------	130	(4)	--------	3	1	(4)	1	138
France	638	48	--------	1	--------	63	1	(4)	34	256	7	3	1,051
Germany, West	--------	12	2	128	98	159	--------	(4)	41	--------	9	6	455
Italy	107	116	1	--------	--------	240	1	(4)	30	227	9	144	875
Netherlands	--------	5	1	191	--------	317	(4)	(4)	25	--------	11	11	561
Norway	--------	3	(4)	--------	--------	62	(4)	--------	1	206	2	6	280
Sweden	--------	4	(4)	158	--------	205	(4)	--------	6	17	3	7	400
Switzerland	--------	1	--------	--------	--------	63	2	--------	10	--------	3	4	83
Turkey	--------	20	78	37	--------	213	18	--------	4	--------	1	14	385
United Kingdom	462	192	302	4,597	594	1,799	(4)	(4)	108	28	66	1	8,149
Other Europe	--------	77	111	194	--------	461	1	--------	35	77	10	12	978
Total Europe	1,207	490	497	5,478	692	4,451	27	(4)	312	818	127	219	14,318

See footnotes at end of table.

TABLE 81.—Crude petroleum and petroleum products exported from continental United States, 1953–54, by country of destination and shipments to and exports from Territories and possessions in thousand barrels [1]—Continued

[U. S. Department of Commerce]

Country	Crude petroleum	Gasoline [2] [3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [2]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [3]	Total
Asia:													
Aden		(4)		13		1						(4)	14
India		171	1,450	94		521	101	1	1	11	9	11	2,370
Indochina		4				47	359		(4)		3	10	423
Indonesia		1	(4)			40	68		6		11	4	130
Japan-Nansei and Nanpo Islands	726	453	96	271	6,318	65	11	6	12	628	16	290	8,892
Pakistan			72	52		104			(4)		3	4	235
Philippines		12	33	43		164	140	6	42		10	12	462
Other Asia		23		56	200	217	77	(4)	54	25	20	31	703
Total Asia	726	664	1,651	529	6,518	1,159	756	13	115	664	72	362	13,229
Africa:													
Belgian Congo		62	14	73	14	50	28		(4)	(4)	1	8	250
Egypt		(4)	601	229		160			1		4	3	998
French West Africa		33	9	214	112	15	(4)		(4)			3	386
Mozambique				66		9	9	1	1		1	2	89
Union of South Africa		127	22	55		259	94	2	17	(4)	27	29	632
Other Africa		17	14	114	35	136	35		1		2	25	379
Total Africa		239	660	751	161	629	166	3	20	(4)	35	70	2,784
Oceania:													
Australia		285	138	365		537	(4)	(4)	2	(4)	6	2	1,335
New Zealand		12	2			115	21	1	2		4	(4)	157
Other Oceania		50	16	45	4	2	1	(4)			(4)	(4)	118
Total Oceania		347	156	410	4	654	22	1	4	(4)	10	2	1,610
Grand total	13,599	26,618	4,001	21,931	20,338	14,482	1,598	3,912	1,340	3,214	293	1,014	112,340
Shipments from continental United States to Territories and possessions:													
Alaska and Hawaii [6]		4,553	131	2,202	5,962	121	162	41	(7)	61	(7)		13,233
Puerto Rico	(7)	2,810	716	273	(7)	53	107	(7)	(7)	(7)	(7)	4	3,963
Wake	(7)	472	(4)	17	(7)	3		(7)	(7)	(7)	(7)	(4)	492
Other	(7)	41	14	35	(7)	4	2	(7)	(7)	(7)	(7)	(4)	96
Total		7,876	861	2,527	5,962	181	271	41	(7)	61	(7)	4	17,784

Exports from noncontiguous Territories and possessions to foreign countries:													
Alaska	----------	127	7	231	5	1	----------	----------	----------	----------	----------	(4)	371
Other	----------	1	1	2	----------	(4)	----------	----------	(4)	----------	(4)	(4)	4
Total	----------	128	8	233	5	1	----------	----------	(4)	----------	(4)	(4)	375
Total net shipments from continental United States	13, 599	34, 366	4, 854	24, 225	26, 295	14, 662	1, 869	3, 953	1, 340	3, 275	293	1, 018	129, 749

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[1] Compiled by M. B. Price and E. D. Page, of the Bureau of Mines, from records of U. S. Department of Commerce.

[2] Country and continent totals exclude, but grand totals include: 1953—13,044 (revised figure); 1954—16,282 thousand barrels of aviation gasoline; 1953—4,752; 1954—5,511 thousand barrels of lubricating oils; and 1953—410, 1954—148 thousand barrels of jet fuel for which country breakdown may not be published for security reasons.

[3] Includes naphtha but excludes benzol (thousand barrels): 1953—30; 1954—140.

[4] Less than 500 barrels.

[5] Revised figure.

[6] Figures represent shipments from refining companies to Alaska and Hawaii through Pacific coast ports as reported to Bureau of Mines by shippers.

[7] Not separately classified.

WORLD PRODUCTION[2]

World crude-oil production increased 4.6 percent in 1954 to average 13,674,000 barrels daily, even though United States production decreased from 1953. Crude-oil production in the United States was almost 2 percent below that in the previous year and represented 46.4 percent of the world total, compared with 49.4 percent in 1953. The countries of the Middle East (Bahrein Island, Iran, Iraq, Kuwait, Qatar, and Saudi Arabia) supplied 20 percent of the world total in 1954, compared with 19 percent a year earlier. Venezuela, the second largest crude-oil-producing country, furnished 14 percent of the total in both years. Crude-oil production in the Western Hemisphere rose 1 percent in 1954, compared with a 12-percent growth in Eastern Hemisphere output. On October 29, 1954, the agreement between Iran and an 8-company international consortium was approved, thereby returning Iranian oil to world markets for the first time in more than 3 years.

Canadian crude-oil production again increased notably; the Province of Alberta supplied 91 percent of total production. No major field discoveries were made in Canada during 1954. A followup of the 1953 Pembina field discovery about 65 miles southwest of Edmonton established this area as a producing field with prospects of becoming one of the largest in North America. Looping of 650 miles of the interprovincial pipeline running from Edmonton to Superior, Wis., increased daily intake capacity at Edmonton from 170,000 to 217,000 barrels.

Crude-oil production in Mexico increased almost 16 percent. The Angostura oil field (discovered in 1953), 40 miles southwest of Veracruz, and the Casa Blanca field (discovered in 1954), 8 miles northwest of Angostura, have demonstrated commercial possibilities for a considerable area in the Veracruz vicinity.

South America increased production 7 percent over 1953, as both Venezuela and Peru reversed their production declines of a year earlier. Venezuela increased production 130,000 barrels a day to establish a new record. Bolivia nearly tripled the previous year's production. Chile raised production by over a third and late in the year placed in operation its first major oil refinery, with a capacity of 20,000 barrels a day, located near Valparaiso. In Argentina the Government oil company, Yacimientos Petroliferos Fiscales (Y. P. F.), increased oil production over 5 percent, while production of other companies decreased 4 percent.

Western Europe raised crude-oil production significantly in 1954. Germany continued to be the largest producer and increased output 23 percent. In France the outstanding event was the discovery in March of the Parentis field, 45 miles from Bordeaux. The discovery well flowed at the rate of 3,500 barrels of oil a day. During the year 5 wells were completed (4 of which were productive), and this field accounted entirely for the 41-percent increase in France's production. Crude production in the Netherlands continued to increase, and 4 additional wells were drilled (2 of which were productive) in the Rijswijk field discovered in 1953. Yugoslavia increased production by one-fourth in 1954. In March 1954, Turkey enacted a new petroleum law permitting private concerns to prospect for petroleum, and several oil companies have received permits to do geological exploration work.

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[2] By F. X. Jordan, Office of Oil and Gas, U. S. Department of the Interior.

No reliable information is available for other countries in Eastern Europe. It is estimated from meager data that the U. S. S. R. increased production 13 percent in 1954 and that Rumanian production apparently increased about 6 percent.

Crude-oil production in Africa dropped 15 percent almost entirely because of the decline in the output from the Asl field in Egypt. Exploration activity continued to increase in Africa in 1954, and more wildcat wells were completed and more drilling rigs in operation during the year than ever before.

Middle East production increased 13 percent to average 2.7 million barrels daily. Saudi Arabia and Kuwait, the largest producing countries, produced at almost identical rates of about 953,000 barrels daily during 1954. Iraq production continued to climb, and in December commercial output began in the Basrah Petroleum Co. new oilfield at Rumaila, about 20 miles west of the Zubair field. In Iran the consortium has set up 2 companies to operate in the country, 1 concerned with exploration and production and the other with refining. The National Iranian Oil Co. remains the Government petroleum authority. The consortium has undertaken to export 300,000 barrels of Iranian crude oil a day for the first year, after a 3-month startup period. Commercial production and export began in the neutral zone between Saudi Arabia and Kuwait in early 1954.

In the Far East the United States of Indonesia increased production by 6 percent, primarily from the southern Sumatra fields. Crude-oil production from the Vogelkop area of New Guinea was increased 131 percent because of completion in March of an 8-inch pipeline from the Mogoi field to Muturi at seaboard. British Borneo's production was slightly below that in 1953. Pakistan and Burma raised production 10 and 23 percent, respectively. Press reports from Communist China indicate a considerable increase in crude-oil output in 1954. Although discovery of crude petroleum in Western Australia was reported last year, four additional wells drilled in 1954 on the Rough Range structure were abandoned as dry holes.

TABLE 82.—World production of crude petroleum, by countries, 1950–54, in thousand barrels [1]

[Compiled by Pearl J. Thompson]

Country	1950	1951	1952	1953	1954 [2]
North America:					
Canada	29,044	47,615	61,237	80,899	96,070
Cuba [3] [4]	156	128	36	17	25
Mexico	72,443	77,312	77,275	72,440	83,653
Trinidad	20,632	20,843	21,258	22,346	23,629
United States	1,973,574	2,247,711	2,289,836	2,357,082	2,316,323
Total	2,095,849	2,393,609	2,449,642	2,532,784	2,519,700
South America:					
Argentina	23,353	24,465	24,825	28,501	29,650
Bolivia	616	523	526	601	1,695
Brazil	339	691	750	916	990
Chile	629	759	906	1,264	1,736
Colombia	34,060	38,398	38,683	40,179	40,547
Ecuador	2,632	2,708	2,839	2,967	3,146
Peru	15,012	16,110	16,403	15,999	17,161
Venezuela	546,783	622,216	660,254	644,243	691,812
Total	623,424	705,870	745,186	734,670	786,737
Europe:					
Albania [4]	2,800	1,200	1,100	1,400	1,600
Austria [4]	10,200	15,477	20,400	21,100	21,000
Czechoslovakia [4]	292	644	740	900	1,100
France	909	2,036	2,377	2,555	3,599
Germany, West	8,107	9,681	12,435	15,505	19,008
Hungary [4]	3,700	3,500	3,500	5,000	7,500
Italy	63	135	487	656	535
Netherlands	4,897	4,942	4,975	5,701	6,535
Poland [4]	1,205	1,502	1,700	1,800	2,000
Rumania [4]	32,000	31,000	45,000	52,000	55,000
U. S. S. R. [4] [5]	266,200	285,000	322,400	363,000	411,000
United Kingdom	340	335	407	410	450
Yugoslavia	794	1,067	1,091	1,236	1,557
Total [4] [5]	331,507	356,519	416,612	471,263	530,884
Asia:					
Bahrein	11,016	10,994	11,004	10,978	10,992
Burma	532	858	942	1,073	1,321
China [4]	800	900	1,000	1,500	3,000
India	1,867	1,949	1,900	2,215	2,235
Indonesia	48,400	55,453	62,495	75,148	79,432
Iran	242,475	[4] 127,600	[4] 10,100	9,400	[4] 22,400
Iraq	49,726	65,122	141,100	210,268	228,432
Japan	2,066	2,337	2,134	2,101	2,124
Kuwait	125,722	204,910	273,433	314,592	347,319
Kuwait-Neutral Zone	------	------	------	------	5,995
Pakistan	1,281	1,348	1,580	1,762	1,945
Qatar	12,268	18,009	25,255	31,025	36,450
Sarawak and Brunei	30,958	37,506	38,251	36,848	36,377
Saudi Arabia	199,547	277,963	301,861	308,294	347,845
Taiwan (Formosa)	23	21	18	17	35
Turkey	108	133	146	179	399
U. S. S. R.: Sakhalin [4]	7,000	7,000	7,000	7,000	8,000
Total [5]	733,789	812,103	878,219	1,012,400	1,134,301
Africa:					
Algeria	24	49	348	641	570
Egypt	16,373	16,311	16,464	16,501	13,774
French Morocco	305	587	749	761	881
Total	16,702	16,947	17,561	17,903	15,225
Oceania:					
Australia (Victoria)	1	2	------	------	------
New Guinea	1,748	1,746	1,725	1,751	4,045
New Zealand	7	5	9	8	7
Total	1,756	1,753	1,734	1,759	4,052
World total (estimate)	3,803,027	4,286,801	4,508,954	4,770,779	4,990,899

[1] This table incorporates a number of revisions of data published in previous Petroleum chapters.
[2] Preliminary figures.
[3] Natural naphtha and gas oil.
[4] Estimate.
[5] U. S. S. R. in Asia (except Sakhalin) included with U. S. S. R. in Europe.

PETROLEUM TECHNOLOGY[3]

EXPLORATION FOR NEW RESERVES

The oil industry continued to explore for new reserves during 1954 at a high level. The cost of exploratory drilling remained high, although it was slightly less on a footage-drilled basis than during the preceding year, principally because of improvements in drilling methods.

Exploratory drilling continued at a high rate in 1954, although slightly less exploratory footage was drilled than in 1953. Data in table 83 show the annual increases in proved reserves of total liquid hydrocarbons by barrels and value,[4] the amounts and costs of total dry-hole exploratory drilling, the average depths of all wells drilled, and the number of wells drilled below 15,000 feet. All data are given annually for 1947 through 1954. References from which the data were obtained also are listed. Figure 10 shows plots of the exploratory footage and dry-hole exploratory footage drilled compared with annual increases in proved reserves of total liquid hydrocarbons from new fields and new pools for the years 1947 through 1954.[5] [6] The reserve figures do not include oil produced during the year. The percentage of productive exploratory footage of the total exploratory footage drilled

TABLE 83.—Quantity and value of proved new reserves of total liquid hydrocarbons, amount and cost of exploratory drilling, average depth of all wells drilled, and number of deep wells drilled in the United States, 1947–54

Year	New proved reserves [1]		Exploratory drilling [2]					Total drilling	
				Total		Dry hole			
	Thousand barrels	Value, [3] thousand dollars	Cost per foot, [4] dollars	Thousand feet	Cost, thousand dollars	Thousand feet	Cost, thousand dollars	Average depth all wells, feet [5]	Number of wells below 15,000 feet [6]
1947	504, 731	968, 341	10. 25	26, 393	245, 740	20, 227	243, 735	3, 404	8
1948	461, 164	1, 189, 803	10. 75	32, 741	351, 967	25, 562	274, 792	3, 463	7
1949	982, 982	2, 496, 774	10. 75	34, 798	374, 082	26, 438	284, 209	3, 558	10
1950	623, 099	1, 563, 978	11. 00	40, 175	441, 927	30, 957	340, 527	3, 689	5
1951	464, 750	1, 175, 819	11. 50	49, 344	567, 453	38, 723	445, 315	3, 869	12
1952	578, 096	1, 462, 583	12. 00	55, 615	667, 385	43, 731	502, 907	4, 060	24
1953	687, 602	1, 842, 773	12. 50	60, 702	758, 780	47, 280	591, 000	4, 016	24
1954	672, 326	1, 862, 343	12. 00	59, 581	714, 972	45, 792	549, 504	4, 025	53

[1] Total annual increase in liquid hydrocarbon reserves through discovery of new fields and new pools in old fields. Does not include production or new reserves through revisions of estimates or extensions to known fields. American Gas Association and American Petroleum Institute, Proved Reserves of Crude Oil, Natural-Gas Liquids, and Natural Gas: Vol. 9, 1954, 22 pp.

[2] Includes new-field wildcats, deeper tests, and long extensions. Does not include field development wells. Lahee, F. H., Exploratory Drilling in 1954: Bull. Am. Assoc. Petrol. Geol., vol. 36, No. 6, June 1955, p. 787.

[3] Based on average price per barrel of crude oil at wells; from Bureau of Mines Minerals Yearbooks.

[4] Drilling, vol. 16, No. 4, February 1955, p. 83; based on total rotary-drilling cost.

[5] Teague, J. U., New Concepts in Driller-Contractor-Operator Relationships: Drilling Contractor, vol. 11, No. 3, April 1955, pp. 58–62; based on all drilling.

[6] Adams, Ernestine, Operators Completed 53 Deep Wells in 1954: Petrol. Eng., vol. 27, No. 1, January 1955, p. B–27; based on all drilling.

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[3] By J. Wade Watkins and C. J. Wilhelm.

[4] See table 5 of this chapter.

[5] American Gas Association and American Petroleum Institute, Proved Reserves of Crude Oil, Natural-Gas Liquids, and Natural Gas: Vol. 9, 1954, 22 pp.

[6] Lahee F. H., Exploratory Drilling in 1954: Bull. Am. Assoc. Petrol. Geol., vol. 36, No. 6, June 1955, p. 787.

in 1954 (23.1 percent) was slightly more favorable than in 1953 (22.1 percent). However, the new proved reserves declined, compared with 1953, as did the ratio of new reserves to the exploratory footage drilled.

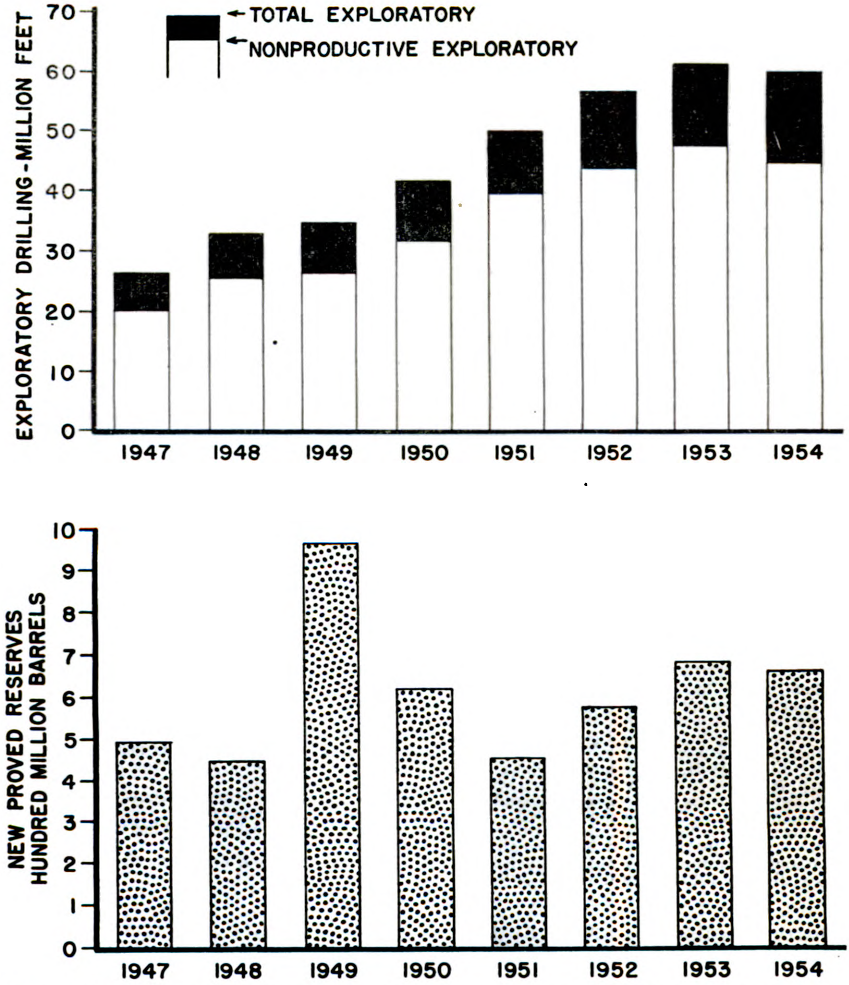

Figure 10.—Changes in new proved reserves of total liquid hydrocarbons, new fields and pools, and feet of exploratory drilling, by years.

DRILLING AND WELL-COMPLETION METHOD

Two changes in the development of oil production during 1954 were of both technical and economic significance to the petroleum industry. In the effort to find new fields, more deep wells were drilled than in any preceding year. More than twice as many wells (53 wells) were drilled to depths below 15,000 feet in 1954 than in either 1952 or 1953, when 24 wells were drilled annually below that depth. However, the average cost per well of deep-well drilling in

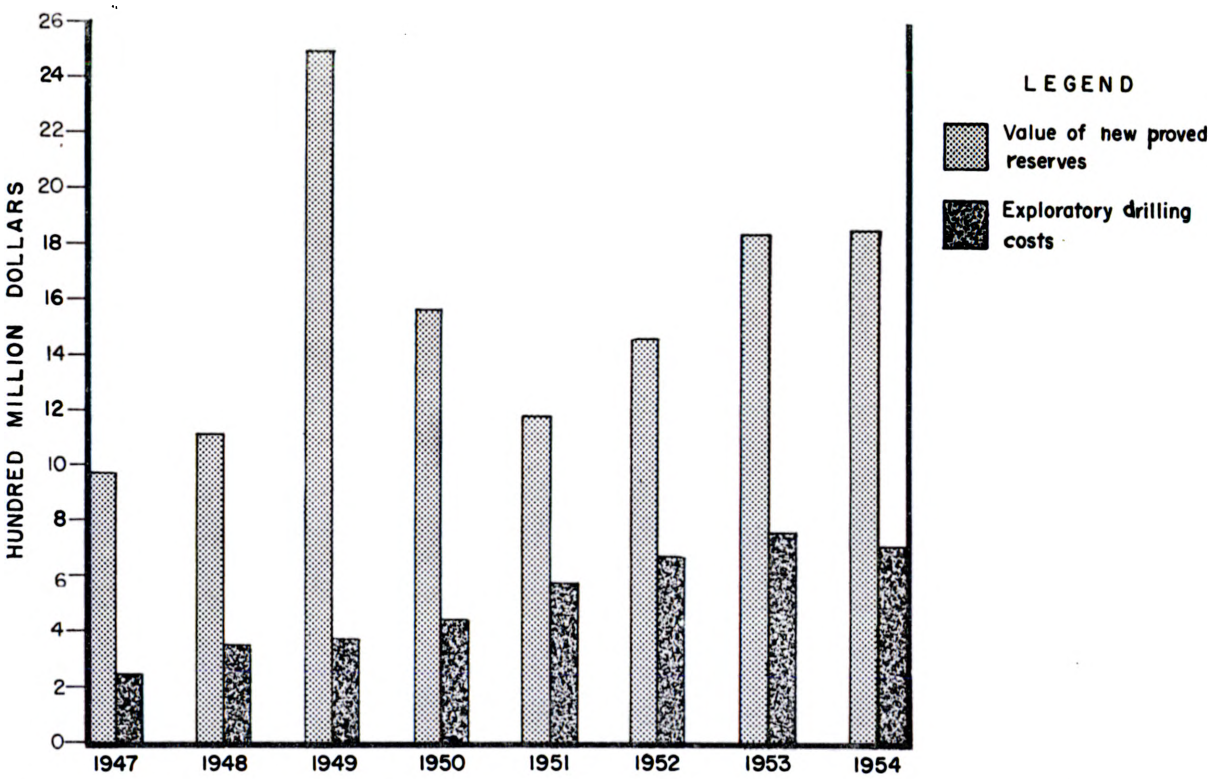

Figure 11.—Value of new proved reserves of total liquid hydrocarbons, new fields and pools, and total cost of exploratory drilling, by years.

1954 was less than in 1953, and the total cost per foot of rotary drilling also was slightly less. Lower drilling cost resulted principally from improved drilling methods.

The second change in drilling procedures and the one that effected the greater economy in drilling costs was the extended use of "slim-hole" drilling for moderate to deep wells. Reduced hole size was accompanied by lower costs both for drilling and for completing wells.

Figure 11 shows graphically the total cost of exploratory drilling as compared to the value of the new reserves developed from 1947 through 1954. The data plotted were taken from table 83. The value of annual increases in proved reserves of total liquid hydrocarbons in new fields and in new pools per dollar expended in exploratory drilling was $2.60 in 1954 compared with $2.43 in 1953. The highest dollar benefit on this basis for the years shown was $6.67 for 1949, and the lowest was $2.07 for 1951. The plotted annual increases in proved reserves do not include production figures; however, the increases shown are indicative of the profit trend. The higher costs of the increasingly difficult task of finding new oil reserves have been partly offset only through more efficient and economical practices in exploration and drilling.

Other technological improvements in drilling methods, used more extensively during 1954, included the use of air and natural gas as drilling fluids, both for drilling and coring, and the use of improved additives for drilling muds.[7] Rotary-percussion drilling, which employs both a vertical stroke and rotary motion, was introduced on an experimental basis in 1954.

By far the most significant new technique in well completions in 1954 was the widespread use of intentional fracturing of oil-productive formations by the injection of sand carried in a liquid, at high pressures, for increasing the flow of oil into well bores. No current figures are available for the extent of hydraulic fracturing in 1954 and the years immediately preceding. One source [8] reported only 137 hydraulic-fracturing jobs in 1949 and a total of 40,000 by January 1954, with a then current monthly average of 2,500. Another source [9] reported 5,000 fracture jobs in Oklahoma alone from January through September 1953. No data are available for the increased oil produced because of the application of hydraulic fracturing. However, several old fields in the midcontinent area have been revived because of hydraulic-fracturing methods, and much oil has been produced from formations that formerly were not considered to be economically productive. Significant improvements in 1954 included application of hydraulic fracturing to multiple zones in one well and development of additives that permitted controlling the extent and directions of fractures.

New cement additives designed to yield low-weight, high-strength cements also were developed during 1954. High-strength wire rope for rotary-drilling lines and new finishing facilities for producing oil-country tubular products for high strengths in deeper drilling also were introduced.

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[7] Oil and Gas Journal, Review-Forecast Section: vol. 53, No. 39, Jan. 31, 1955, pp. 136–192.

[8] Clark, Roscoe C., Jr., Hydraulic Fracturing of Oil and Gas Wells: Oil and Gas Jour., vol. 52. No. 19, Sept. 14, 1953, pp. 122–135.

[9] Roberts, George, Jr., Hydraulic Fracturing After 4½ years: Oil and Gas Jour. vol. 52. No. 43, Mar. 1, 1954, pp. 82–86.

DISCOVERIES

Although no new large oil fields were discovered in 1954, production was found in three new States by land drilling. Producing wells were completed in South Dakota; in the Eagle Springs field, Nye County, Nev.; and in the Black Mesa Basin, Apache County, Ariz. New discoveries were made in four basins—the Paradox Basin, Utah; the Dalhart Basin, northwestern Texas; the Delaware Basin, West Texas; and the North Park Basin, Colorado.[10]

Increased offshore exploration, made possible by improved drilling equipment and methods, and some clarification of legal questions pertaining to oil rights, resulted in the discovery of the first field off the California coast, the first 2 fields off the Texas coast, and 16 new fields off the coast of Louisiana. At least 4 of the 16 new Louisiana fields were considered to be important.[11]

PRODUCTION METHODS

One of the most significant trends in oil-production methods put into more widespread practice during 1954 was the use of automatic control of pumping and separating equipment. The first completely automatic tank battery was put into service in Texas.[12] The use of automatic controls in production not only results in lower overall operating costs but also effects a saving in manpower. Sound waves were used to motivate a new deep-well pump that has been tested successfully in California.[13] Greater use was made of "down-the-hole" treatment in oil-production wells with demulsifying chemicals and corrosion inhibitors. Demulsifiers and thermal demulsification units were used more extensively on many leases, particularly in the colder sections of the country. Extended use was made of corrosion-resistant and noncorrodible equipment for petroleum production, such as cement-asbestos and plastic gathering lines. Improved plastics made possible their increased use.

Reinjection of gas or water produced with crude petroleum was responsible for the continued production of significant quantities of crude petroleum. According to estimates of the Interstate Oil Compact Commission, 318 million barrels of oil was produced during 1953 by pressure maintenance.[14] This amounted to approximately 13.5 percent of the total oil produced during that year. Preliminary reports indicate that oil production by pressure maintenance for 1954 was at a continued high rate. Examples of continued successful pressure maintenance projects are the East Texas water-injection project and the successful water-injection project in the New Hope field, Franklin County, Tex. Modern and efficient operating practices are evident in both projects.

New technological developments in represssuring partly depleted petroleum reservoirs with gas and air were continuance of the successful experimental injection of natural gas at high pressure in Block

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[10] See footnote 7, p. 120.

[11] See footnote 7, p. 120.

[12] See footnote 7, p. 120.

[13] Mechanical Engineering, Mechanical-Engineering Progress in the Petroleum Industry: vol. 76, No. 8, August 1955, pp. 640–645.

[14] Sweeney, Albert E., Jr., The Magnitude of Fluid Injection Operations in the United States: Producers Monthly, vol. 19, No. 10, August 1955, pp. 41–43. (Also communications from Albert E. Sweeney, Jr. dated Oct. 21 and Oct. 27, 1955).

31 field, Crane County, Tex., and the start of an experimental project in the Camp Hill field in Texas where liquefied petroleum gas is being injected.[15]

Numerous new technical developments were applied to waterflood operations during 1954. This year marked the start of water injection into the Scurry Reef field in Texas—the largest potential waterflood in the United States. The deepest waterflood, in the Ellenberger formation at 13,000 feet, also was started in West Texas.[16] The "imbibition" method of flooding low-permeability formations was continued with success in the Spraberry trend in Texas. The first large waterflood in California was started, and successful conditioning of Pacific Ocean water for flooding made available a huge potential source of water for flooding coastal fields.

Detergents were used experimentally as flood-water additives in several field trials to increase rates of water injection and oil production.[17] Newly developed organic corrosion inhibitors and bactericides were used in many projects to minimize corrosion and prevent plugging of water-input wells. Filtration was improved in many installations by the use of element-type, diatomaceous earth filters of new design constructed from corrosion-resistant materials. Significant improvements were made on an experimental basis in the efficiency of removal of dissolved acidic gases from water by scrubbing with combustion exhaust gases and in the use of submerged burners.[18] [19] Hydraulic fracturing was first applied on an organized basis to water-input and oil-production wells in water floods with significant increases in oil production.[20]

Information was released by two large oil companies in 1954 on the preliminary results of experimental laboratory and field tests of methods of increasing oil production by partial combustion of oil in place in the reservoir.[21] [22] Similar research was started by several other production-research organizations.

CHANGES IN SOURCE OF CRUDE PETROLEUM

Deeper drilling in quest of new reserves caused much of the wildcat activity to be centered in the Gulf Coast States, the Rocky Mountain States, and California.[23] Three new States—South Dakota, Nevada, and Arizona—were introduced as producers in 1954, thus extending the range of possibilities of oil production from new areas.

Improved offshore drilling techniques, the success of some offshore drilling operations, and partial clarification of the legal questions pertaining to offshore and tidelands oil rights were responsible for increased drilling and discoveries in offshore locations.

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[15] See footnote 7, p. 120.

[16] See footnote 7, p. 120.

[17] Dunning, H. N., Johansen, R. T., Walker, C. J., Powell, J. P., and Watkins, J. W., What Detergent Injection Did at Grover Flood: Oil and Gas Jour., vol. 54, No. 19, Sept. 12, 1955, pp. 115-19.

[18] Doscher, Todd M., and Tuttle, Robert N., The Preparation of a Subsurface Injection Water From a Sour Brine: Producers Monthly, vol. 19, No. 1, November 1954, pp. 28-32.

[19] Hart, W. J., and Wingate, R. C., Removal of Sulfides From Brines by Aeration With Exhaust Gas From Submerged Combustion: Presented at Petroleum Branch Fall Meeting, AIME, New Orleans, La., Oct. 5, 1955.

[20] See footnote 7, p. 120.

[21] Grant, Bruce F., and Szasz, Stefan E., Development of an Underground Heat Wave for Oil Recovery: Jour. Petrol. Technol., vol. 6, No. 5, May 1954, pp. 23-32.

[22] Kuhn, C. S., and Koch, R. L., In Situ Combustion . . . Newest Method of Increasing Oil Recovery: Oil and Gas Jour., vol. 52, No. 14, August 1953, pp. 92-96.

[23] See footnote 7, p. 120.

Figure 12 shows graphically the trends in crude oil produced by primary reservoir energy, pressure-maintenance by water injection, the injection of gas and air, and the injection of water from 1947 through 1953.[24] Complete data are not yet available for 1954. The data from which the plots of this figure were made are only approximations, as it is impossible to separate production figures absolutely according to the method of production. However, the trends of production from projects classified as to the source of energy are clearly shown. From 1951 through 1953 total crude-oil production remained essentially constant. Oil produced by pressure maintenance by the injection of water has increased generally for the 7-year period. Oil produced by gas and air injection has increased annually, as has oil produced by waterflooding. These data also are presented in table 84.

TABLE 84.—Approximate production of crude petroleum by primary methods, pressure maintenance by water injection, total gas injection, and water flooding, 1947–53, by years.

(Thousand barrels)

Year	Total [1]	Primary [2]	Pressure-maintenance water,[3]	Total [3] [4] gas injection	Water-flooding [3]
1947	1,850,445	1,635,345	128,000	65,000	22,100
1948	2,002,448	1,768,948	130,000	77,500	26,000
1949	1,818,800	1,567,300	118,000	102,500	31.000
1950	1,943,776	1,638,776	135,000	135,000	35,000
1951	2,214,321	1,867,571	152,000	149,000	45,750
1952	2,256,765	1,864,265	155,000	157,500	80,000
1953	2,311,856	1,867,056	183,100	167,200	94,500

[1] American Petroleum Institute and American Gas Association Report on Proved Reserves of Crud Oil, Natural-Gas Liquids, and Natural Gas: Vol. 9, Dec. 31, 1954, 22 pp.

[2] By difference.

[3] Data obtained from Interstate Oil Compact Commission, Oklahoma City, Okla.

[4] Includes some gas condensate.

CONSERVATION PRACTICES

Increased production of petroleum has resulted from the conservation practices of the oil industry. This is borne out by the production increases previously cited for pressure maintenance by water injection, gas and air injection, and waterflooding. In water injection, and to a large extent in the injection of air and gas, return of those fluids to the reservoir not only has been responsible for the production of significant quantities of oil but has been instrumental in complying with State regulations governing the disposal of oilfield brines and the venting and flaring of natural gas.

Laws in some States were strengthened during 1954 to prevent further contamination of surface waters and potable-water-bearing formations by oilfield brines. Such regulations necessitate subsurface injection of the brines which, when applied to the producing formation, usually results in significant increases in oil production. Monthly proration orders were issued during 1954 by six of the major oil-producing States. Proration and other regulatory measures of oil-producing States are directed toward prevention of waste and recovery of oil at a reasonable cost while maintaining a rate of production consistent with market demand and providing for the recognition of equities of individual owners.

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[24] See footnote 13, p. 121

The leasing and supervision of Federal lands was continued by Government agencies. An example of this action is the Indian lands in Osage County, Okla. Increased production royalties and income from the sale of leases were occasioned by the success of a large waterflood operation in the North Burbank pool, the successful use of hydraulic-fracturing methods in the completion of primary wells, and judicious management of the interests of the Osage Nation. This activity was at least partly responsible for maintaining a high rate of oil production in Oklahoma without significant new discoveries of large reserves within the State.

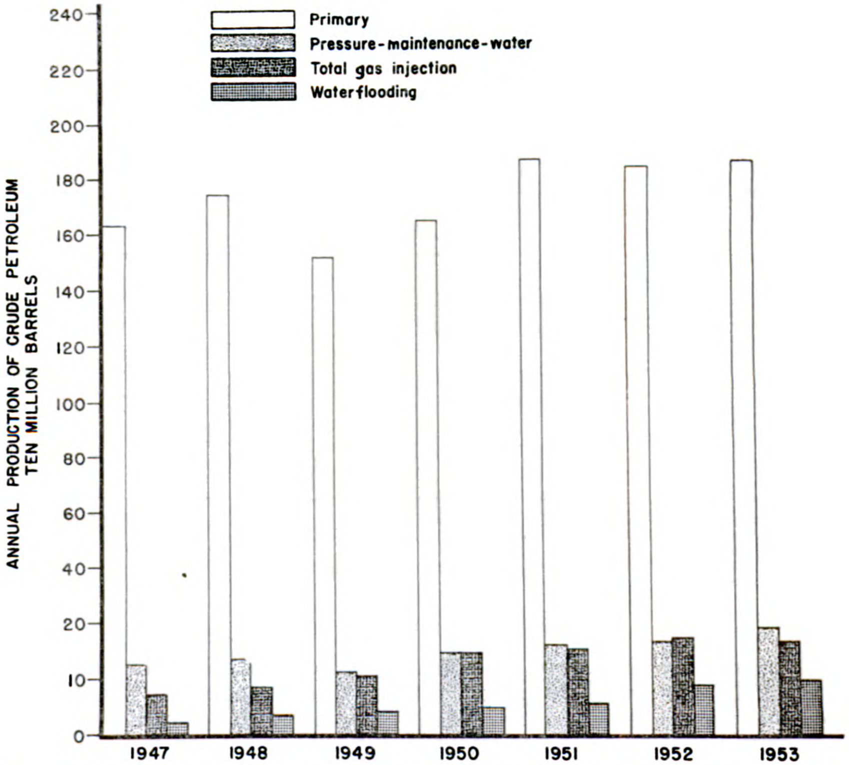

FIGURE 12.—Approximate production of crude petroleum by primary methods, pressure maintenance by water injection, total gas injection, and waterflooding, by years.

TRANSPORTATION AND STORAGE

Additional research was done on improved external and internal protective coatings for pipelines to minimize corrosion. A flexible external coating that will withstand cold bending of the pipe was developed. An automatic welding machine for aluminum pipe was constructed and used successfully. The use of air for testing finished pipelines was demonstrated during 1954. Oil-field surveying methods, employing a gyroscopic compass and an inclinometer mounted on a "go-devil," were used to locate pipelines in river beds.

Automatic control of fluid transmission, embodying the electronic "feedback" principle, was extended. Microwave relay systems were used extensively for intercommunication between pump stations and main offices. The largest oil line built by the end of 1954 was 31 inches in diameter; however, 30- to 36-inch lines are common in the gas industry. The most notable change in pipeline design has been in prime movers and pumps; for example, the gas turbine as prime mover has come into its own. Another important contribution to the natural-gas industry was publication of American Standards Association B–31, Section 8, Code on Gas Transmission and Distribution Piping Systems.

The use of gravitometers and radioactive tracers provides methods for locating the interface of different transported fluids. The radioactive tracers also provide a means of starting and stopping automatic booster stations.

Tankage at pumping stations is primarily to absorb various pumping rates and to provide some control on batching and grades of oil pumped. Present tanks are all-welded structures ranging up to 200,000 barrels in capacity. Automatic welding machines have been developed to weld horizontal and vertical seams. The roofs used are floating structures that rise and fall with the liquid, minimizing corrosion and evaporation losses. In addition, tank-breathing devices, vapor-recovery systems, and plastic foam are now being used to reduce evaporation loss. Agitation by electric mixers and directional nozzles have provided effective control in the problem of the accumulation of basic sediment and water (BS&W) in tanks.

The automatic tank gage, with its associated remote-transmission system, gained widespread use and has been adopted by the oil industry for buying and selling crude oil on a mutual-agreement basis. Electrical averaging resistance thermometers have been developed to measure the average temperature of a volume of oil in a tank, making remote transmission of temperature possible.

Underground storage of gas and liquid hydrocarbons in artificial and natural caverns has received considerable attention by the petroleum industry; however, the crude-oil-pipeline companies do not, at present, use this method of storage. Considerable evaluation has been made on plastic tanks in small sizes as a possible answer to tank corrosion and other incrustation buildup.

DEVELOPMENTS IN REFINING[25]

Activity in the refining industry continued at a high level during 1954. Several process modifications and new processes were announced, more emphasis was placed on the production of light distillates, and increased interest was shown in such new possibilities as the applications of nuclear energy in refining.

Catalytic reforming is the fastest growing process in the refining industry today. After construction of the first fixed-bed hydroformer in 1939, catalytic reforming capacity increased slowly for the next 10 years; the process was used mainly to produce toluene and other aromatics, especially during World War II. Since 1950 the process has grown rapidly and has been tremendously important to the refiners for the production of the higher octane-number gasoline demanded by the automotive industry. Domestic catalytic reforming capacity increased from 125,000 barrels daily at the end of 1951 to 600,000 barrels daily at the end of 1954, when 11 catalytic reforming processes were available to the refining industry.

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[25] By Jack E. Phillips and C. W. Kelley

In addition to its major use in the production of high-octane-number gasoline, catalytic reforming is becoming increasingly important in the production of the three major aromatics—benzene, toluene, and xylene. In 1954 approximately 280 million gallons of these aromatics was made by catalytic reforming expressly for the chemical markets. This represents about half of the total produced in the United States from all sources and compares with about 250 million gallons produced in 1953.

Another process, introduced commercially in 1954 and designed to increase the yield of distillate products at the expense of residuum, is the Houdresid process. The first unit of this type was put into operation in March 1954. In many respects the Houdresid process resembles the Houdriflow catalytic cracking process, utilizing a downward-moving bed of synthetic or natural clay catalyst through a reaction vessel superimposed on a regenerator, wherein the catalyst is rejuvenated by burning of the deposits that accumulate on the catalyst surface. However, the process is unique in that it is the first successful application of catalytic cracking techniques to a heavy reduced crude charge stock.

Following a general trend of several years, demand for distillate products, including gasoline, increased at the expense of residual fuels. This trend was reflected processwise in the refining industry by installation of new coking units and increased charge to previously installed units. Although the familiar delayed coking processes account for essentially all of today's coking capacity, the relatively new processes of continuous contact coking and fluid coking are receiving close attention in the industry. The first of these was proved on a commercial scale during 1953. Fluid coking was demonstrated commercially late in 1954 and early in 1955. Both of the new coking processes are versatile in terms of charge stock, reportedly being capable of handling residuums ranging from reduced crudes to heavy cracked tars, and both produce a coke product in the form of small granules that are withdrawn continuously from the system, thus eliminating the need for the elaborate decoking equipment of the older delayed coking processes.

Radioactivity has been widely applied in the refining industry in two distinct uses. Isotopes, such as radioactive cobalt, antimony, and zirconium, have been used for a number of years as sources of gamma rays for use in level indicating and control devices. More recently such radioactive materials have been coming into use as tracers, being incorporated into the streams of materials to be traced. By this means it is possible to measure the rate of flow in process pipes by outside measurements with Geiger counters, to check flow patterns in complex piping systems, to detect leakage from one stream to another within such equipment as heat exchangers, to measure the thoroughness of mixing of materials in multicomponent systems, and to perform a variety of similar functions. Seeking new applications of nuclear energy, at least one petroleum company has started active investigation of the use of nuclear energy as a processing tool and plans to study such things as the influence of gamma radiation on the chemical reactions of refining and petrochemical processes.

The long-term trend toward higher octane number of motor gasoline continued. Although competition may be partly responsible for this continuing trend, the major factor is the requirement imposed by the year-to-year increase in compression ratio of the new automobile engines. Surveys by the Bureau of Mines show that since 1951 the nationwide average octane number of Premium Grade gasoline, by the research method, has increased from 90.0 to 93.6, and, for Regular Grade gasoline, has increased from 83.1 to 86.2. Corresponding increases in terms of motor-method octane number were from 82.0 to 84.5 and from 78.1 to 80.8.

Sharply increased use of jet-propelled aircraft by the Armed Forces was reflected in a comparable increase in demand for jet fuels during 1954. This trend is almost certain to be accentuated as jet-propelled civilian aircraft enter the field. At least one domestic air-transport company announced plans for putting turboprop-type aircraft into operation in 1955. Still another and potentially dominating factor in future demand for jet fuels is the probable development of turbine-driven automotive equipment. Interest within the automotive industry is sufficiently great that active competitive experimental work in the field has been undertaken by several automobile manufacturers. Major advantages of gas-turbine engines over the conventional piston types include their considerably decreased ratio of weight to power output and their suitability for operation with relatively cheap fuel. General opinion now is that the fuel for at least the first turbine-driven automobiles will be ordinarily kerosine or a blend of kerosine and heavy gasoline.

Although the demand for lubricating oils has not changed greatly during the past few years, significant changes have been made in the quality of the oils. Improved quality has been necessary to pace the more exacting requirements imposed by new and specialized industrial machinery, more powerful automotive engines operating under closer tolerances, and gas turbine engines. To improve the quality, industry, over a period of years, has devised special refining methods, such as solvent extraction, and, possibly more important, has developed many additives to impart the desired qualities to oils intended for specific uses. By the end of 1954 additives were being blended into lubricating oils of all types at a rate of almost $150 million per year, compared with about $40 million per year in 1948.

Additives are generally classified into nine groups, as follows: Detergents, oxidation inhibitors, viscosity-index modifiers, pour-point depressants, extreme-pressure lubricant agents, oiliness agents, rust inhibitors, antifoam agents, and dyes. At present, on the basis of active chemical ingredients, the quantities and values of the various types of additives being consumed in the lubricating-oil market are approximately as follows: Detergents and inhibitors are being used at a rate of 200 million pounds per year and have a value of about $80 million; extreme-pressure gear-oil additives at 60 million pounds and $15 million per year; viscosity-index modifiers at 25 million pounds and $15 million per year; and pour-point depressants at 10 million pounds and $10 million. The remaining $30 million is divided among oiliness and antifoam agents and dyes.

Opinion is divided as to whether high-quality lubricating oils from petroleum will be suitable for gas-turbine-driven automotive equipment, which soon may be on the market. Mineral-oil lubricants are not considered adequate, for military jet-aircraft use, even when produced by the most advanced refining techniques and when fully fortified with the most applicable additives. Synthetic lubricants are being used to meet the stringent lubrication requirements of military jet-aircraft engines. At present the only synthetic on the market that meets military requirements, as defined in Specification MIL-L-7808, is a product containing di-iso-octyl sebacate and possibly an adipic ester; however, other synthetic lubricants are being investigated actively in Government and industry laboratories. These materials include organophosphorus compounds, silicones, silicate esters, and polyglycol esters.

Petroleum Asphalt

By Albert T. Coumbe, Ivan F. Avery, and Mildred C. Putnam

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SCOPE OF REPORT

FOR THE SECOND consecutive year sales of petroleum asphalt and road oil are published by States. Data for 1953 and 1954 are comparable, to the extent that the survey for the 2 years requested the same information. However, asphalt producers were in a better position to submit a detailed breakdown of sales by States for 1954 than for 1953, the first year for which the questionnaire was revised. All respondents reported their sales by States for 1954, whereas in 1953 a few were unable to furnish this information and the Bureau of Mines estimated their distribution. Of the 89 known asphalt producers canvassed, reports were received from 87. In addition, 26 asphalt-emulsion manufacturers were asked to cooperate with the Bureau of Mines in this survey, and 23 complied. No estimates of sales of nonrespondents were made, as the volume of their business was believed to be relatively unimportant.

TABLE 1.—Salient statistics of petroleum asphalt in the United States, 1953–54, by months and districts

[Thousand short tons]

Month and district	Production		Imports[2] (including natural)		Exports[3]		Stocks (end of period)		Apparent domestic consumption[4]	
	1953	1954[5]	1953[6]	1954[5]	1953[6]	1954[6]	1953	1954[5]	1953[6]	1954[6]
By months:										
January	707	627	31	27	45	15	1,368	1,522	474	447
February	713	719	23	43	37	10	1,579	1,743	488	531
March	853	890	29	35	29	48	1,760	1,994	663	626
April	969	980	43	35	42	41	1,904	2,095	835	873
May	1,173	1,252	31	52	23	45	1,970	2,069	1,115	1,285
June	1,396	1,414	47	63	30	35	1,742	1,741	1,641	1,770
July	1,499	1,609	44	56	21	44	1,532	1,553	1,732	1,809
August	1,521	1,587	59	73	11	19	1,289	1,300	1,812	1,894
September	1,398	1,454	34	85	12	18	1,038	1,075	1,671	1,746
October	1,287	1,348	32	62	17	22	1,007	1,037	1,333	1,426
November	942	976	31	55	15	17	1,135	1,121	830	930
December	707	764	51	44	29	26	1,330	1,305	534	598
Total	13,165	13,620	455	630	311	340	1,330	1,305	13,128	13,935
By districts:										
East Coast	3,055	3,237	(7)	(7)	(7)	(7)	231	214	(7)	(7)
Appalachian	503	546					54	64		
Indiana, Illinois, Kentucky, etc	2,201	2,372					272	271		
Oklahoma, Kansas, etc	1,460	1,552					212	224		
Texas Inland	763	696					98	50		
Texas Gulf Coast	1,032	994					44	83		
Louisiana Gulf Coast	741	796					83	77		
Arkansas, Louisiana Inland, etc	663	720					62	65		
Rocky Mountain	701	827					124	131		
California	2,046	1,880					150	126		
Total	13,165	13,620	455	630	311	340	1,330	1,305	13,128	13,935

[1] Converted from barrels to short tons (5.5 barrels=1 short ton.)
[2] Imports into continental United States only.
[3] Includes shipments to noncontiguous Territories.
[4] Production, plus imports, less exports, plus or minus change in stocks.
[5] Preliminary figures.
[6] Revised.
[7] Figures not available.

TABLE 2.—Salient statistics of road oil in the United States, 1953–54, by months and districts

[Short tons] [1]

Month and district	Production		Stocks, end of period		Apparent domestic consumption [2]	
	1953	1954 [3]	1953	1954 [3]	1953	1954 [3]
By months:						
January	34,546	40,182	90,364	98,364	26,546	21,273
February	31,818	47,091	97,091	118,545	25,091	26,910
March	44,182	47,273	115,818	139,818	25,455	26,000
April	60,546	75,818	137,091	162,727	39,273	52,909
May	106,909	119,636	163,091	178,909	80,909	103,454
June	180,000	178,182	158,545	162,545	184,546	194,546
July	212,909	248,000	121,091	135,273	250,363	275,272
August	220,909	244,000	110,727	131,818	231,273	247,455
September	149,091	153,636	92,364	107,636	167,454	177,818
October	74,545	87,091	73,818	95,818	93,091	98,909
November	46,545	46,000	71,818	85,455	48,545	56,363
December	36,909	24,545	79,455	78,909	29,272	31,091
Total	1,198,909	1,311,454	79,455	78,909	1,201,818	1,312,000
By districts:						
East Coast	7,273	22,545	546	1,454	7,091	21,637
Appalachian	909	5,818	----------	364	909	5,454
Indiana, Illinois, Kentucky, etc	232,364	253,273	5,636	10,182	235,455	248,727
Oklahoma, Kansas, etc	193,273	178,545	8,727	11,818	192,910	175,454
Texas Inland	7,818	4,909	----------	182	7,818	4,727
Texas Gulf Coast	1,636	2,000	182	364	1,999	1,818
Louisiana Gulf Coast	364	364	182	----------	364	546
Arkansas, Louisiana Inland, etc	182	364	182	182	182	364
Rocky Mountain	292,545	322,545	35,455	19,818	289,999	338,182
California	462,545	521,091	28,545	34,545	465,091	515,091
Total	1,198,909	1,311,454	79,455	78,909	1,201,818	1,312,000

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Production, plus or minus change in stocks.
[3] Preliminary figures.

SALES

Sales of petroleum asphalt and products totaled 14.7 million short tons in 1954, a 5-percent increase over 1953. Sales of road oil remained virtually the same as in 1953—1.3 million short tons. Asphalt sales for paving purposes, such as for highways, roads on private property, sidewalks, parking areas, and airfield runways, increased from 9.2 million short tons (65 percent of the total demand in 1953) to 10.0 million (68 percent of demand in 1954). The quantity of portland cement used for such purposes is not available; however, data of the Bureau of Public Roads, United States Department of Commerce, indicate that about 7.6 million short tons of asphaltic products and 7.4 million short tons of portland cement were used for paving and maintaining public highways in 1954 and that an additional 2.4 million short tons of portland cement was used for bridges, culverts, and other structures on public highways. Quantities reported sold for roofing materials declined slightly from 3.5 million short tons in 1953 (25 percent of the total sales) to 3.3 million (22 percent of the total) in 1954. Asphalt sold for the manufacture of miscellaneous products was 1.4 million short tons in 1953 and 1.5 million in 1954, or 10 percent of the demand in both years.

The total sales of asphalt and road oil are only roughly comparable with the apparent domestic consumption shown in tables 1 and 2, because the sales of asphalt and road oil, by States and uses, are reported annually to the Bureau of Mines by the sales departments of the asphalt-producing companies and the asphalt-emulsion manufacturers, whereas the apparent domestic consumption is calculated from the production and stocks reported by the petroleum refineries of the various oil companies and the imports and exports compiled by the Bureau of the Census, United States Department of Commerce, appearing in the Monthly Petroleum Statement of the Bureau of Mines. Furthermore, the sales figures, which include emulsified asphalts, can be slightly above the apparent domestic consumption, as the emulsified asphalts may contain some water or other liquids.

TABLE 3.—Sales of petroleum asphalt paving products in the United States, 1953–54, by districts and States

[Short tons]

District [1] and State	Asphalt cements		Cutback asphalts		Emulsified asphalts		Total	
	1953	1954	1953	1954	1953	1954	1953	1954
District 1:								
Connecticut	33, 525	36, 200	33, 809	33, 614	10, 342	7, 317	77, 676	77, 131
Delaware	8, 266	9, 971	1, 656	9, 357	22	6	9, 944	19, 334
Florida	93, 668	215, 698	124, 970	148, 149	16, 871	14, 034	235, 509	377, 881
Georgia	144, 198	141, 121	49, 146	65, 635	38, 214	33, 508	231, 558	240, 264
Maine	20, 876	23, 265	38, 606	47, 473	7, 494	11, 876	66, 976	82, 614
Maryland and D. C	139, 415	149, 573	92, 315	88, 999	17, 322	21, 263	249, 052	259, 835
Massachusetts	165, 208	150, 515	69, 160	72, 398	5, 487	1, 971	239, 855	224, 884
New Hampshire	6, 949	8, 043	24, 662	31, 226	339	77	31, 950	39, 346
New Jersey	159, 662	196, 293	98, 321	81, 142	9, 025	1, 964	267, 008	279, 399
New York	322, 211	371, 668	159, 080	177, 557	79, 574	81, 501	560, 865	630, 726
North Carolina	101, 582	149, 183	25, 421	107, 801	27, 098	35, 955	154, 101	292, 939
Pennsylvania	296, 079	348, 482	142, 575	126, 147	24, 350	42, 039	463, 004	516, 668
Rhode Island	45, 122	49, 469	33, 230	34, 851	4, 737	3, 122	83, 089	87, 442
South Carolina	71, 703	68, 117	46, 032	53, 974	32, 000	39, 500	149, 735	161, 591
Vermont	7, 942	9, 229	20, 872	19, 550	561	562	29, 375	29, 341
Virginia	86, 431	84, 045	79, 784	107, 514	34	5, 724	166, 249	197, 283
West Virginia	36, 237	41, 794	25, 901	29, 938	8, 820	19, 882	70, 958	91, 614
Total	1, 739, 074	2, 052, 666	1, 065, 540	1, 235, 325	282, 290	320, 301	3, 086, 904	3, 608, 292
District 2:								
Illinois	195, 485	174, 322	179, 955	84, 995	5, 064	4, 155	380, 504	263, 472
Indiana	76, 888	57, 182	107, 850	100, 472	62, 306	74, 567	247, 044	232, 221
Iowa	42, 867	34, 310	58, 168	73, 268	12, 365	28, 951	113, 400	136, 529
Kansas	63, 047	48, 953	180, 136	161, 389	112	58	243, 295	210, 400
Kentucky	66, 531	66, 585	64, 752	76, 667	13, 014	17, 081	144, 297	160, 333
Michigan	138, 552	105, 303	83, 707	75, 631	29, 016	12, 887	251, 275	193, 821
Minnesota	64, 902	113, 316	129, 223	212, 212	5, 550	4, 573	199, 675	330, 101
Missouri	75, 938	95, 139	96, 990	95, 973	8, 884	7, 867	181, 812	198, 979
Nebraska	24, 211	56, 996	45, 105	63, 957	70	55	69, 386	121, 008
North Dakota	42, 534	60, 673	25, 590	40, 509	881	801	69, 005	101, 983
Ohio	218, 680	229, 309	219, 359	248, 280	84, 189	94, 606	522, 228	572, 195
Oklahoma	101, 259	53, 962	162, 244	204, 635	---------	1, 761	263, 503	260, 358
South Dakota	33, 002	41, 264	21, 447	35, 673	---------	81	54, 449	77, 018
Tennessee	143, 253	147, 420	51, 894	64, 752	6, 600	12, 807	201, 747	224, 979
Wisconsin	73, 419	99, 373	88, 249	61, 633	6, 099	6, 185	167, 767	167, 191
Total	1, 360, 568	1, 384, 107	1, 514, 669	1, 600, 046	234, 150	266, 435	3, 109, 387	3, 250, 588
District 3:								
Alabama	83, 795	79, 494	99, 911	97, 263	24, 762	19, 655	208, 468	196, 412
Arkansas	35, 638	46, 903	65, 479	41, 627	12, 846	26, 065	113, 963	114, 595
Louisiana	87, 243	121, 123	16, 514	25, 251	10, 412	10, 184	114, 169	156, 558
Mississippi	18, 134	23, 743	38, 541	7. 301	12, 167	12, 875	68, 842	43, 919
New Mexico	63, 456	95, 122	47, 727	93, 183	4	639	111, 187	188, 944
Texas	387, 476	409, 537	306, 295	173, 435	11, 522	20, 836	705, 293	603, 808
Total	675, 742	775, 922	574, 467	438, 060	71, 713	90, 254	1, 321, 922	1, 304, 236
District 4:								
Colorado	79, 059	71, 369	101, 809	81, 725	1, 335	439	182, 203	153, 533
Idaho	5, 914	29, 160	35, 818	49, 252	1, 714	1, 486	43, 446	79, 898
Montana	5, 820	18, 286	43, 321	63, 792	2, 834	3, 787	51, 975	85, 865
Utah	49, 937	47, 680	48, 961	40, 260	18	---------	98, 916	87, 940
Wyoming	12, 826	14, 510	41, 818	39, 330	308	---------	54, 952	53, 840
Total	153, 556	181, 005	271, 727	274, 359	6, 209	5, 712	431, 492	461, 076
District 5:								
Arizona	18, 925	11, 526	23, 357	26, 114	9, 623	7, 021	51, 905	44, 661
California	588, 890	734, 604	142, 490	67, 602	103. 275	111, 633	834, 655	913, 839
Nevada	23, 259	20, 724	5, 900	6, 703	2, 644	1, 255	31, 803	28, 682
Oregon	109, 025	132, 281	33, 006	43, 667	7, 360	4, 892	149, 391	180, 840
Washington	76, 153	81, 761	57, 168	92, 878	7, 032	1, 220	140, 353	175, 859
Total	816, 252	980, 896	261, 921	236, 964	129, 934	126, 021	1, 208, 107	1, 343, 881
Total United States	4, 745, 192	5, 374, 596	3, 688, 324	3, 784, 754	724, 296	808, 723	9, 157, 812	9, 968, 073

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[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.

TABLE 4.—Sales of petroleum asphalt roofing products in the United States, 1953–54, by districts and States

[Short tons]

District[1] and State	Asphalt cements and fluxes		Emulsified asphalts		Total	
	1953	1954	1953	1954	1953	1954
District 1:						
Connecticut	14, 410	16, 901	226	21	14, 636	16, 922
Delaware	19, 496	21, 369	5	10	19, 501	21, 379
Florida	68, 078	90, 076	705	7	68, 783	90, 083
Georgia	43, 933	37, 797	153	6	44, 086	37, 803
Maine	87	69	--------	--------	87	69
Maryland and D. C	67, 418	55, 891	106	140	67, 524	56, 031
Massachusetts	80, 679	109, 075	528	31	81, 207	109, 106
New Hampshire	663	357	--------	--------	663	357
New Jersey	376, 459	336, 697	841	96	377, 300	336, 793
New York	136, 483	85, 754	774	44	137, 257	85, 798
North Carolina	45, 920	50, 399	3, 051	1, 503	48, 971	51, 902
Pennsylvania	169, 245	155, 064	93	56	169, 338	155, 120
Rhode Island	3, 683	66, 679	62	1	3, 745	66, 680
South Carolina	4, 711	3, 409	--------	1	4, 711	3, 410
Vermont	1, 754	350	4	3	1, 758	353
Virginia	9, 792	2, 411	173	44	9, 965	2, 455
West Virginia	20, 483	1, 839	--------	1	20, 483	1, 840
Total	1, 063, 294	1, 034, 137	6, 721	1, 964	1, 070, 015	1, 036, 101
District 2:						
Illinois	515, 829	514, 203	525	2, 097	516, 354	516, 300
Indiana	115, 567	94, 162	30	11	115, 597	94, 173
Iowa	9, 195	6, 869	1	130	9, 196	6, 999
Kansas	37, 605	7, 786	--------	23	37, 605	7, 809
Kentucky	18, 664	3, 504	302	3	18, 966	3, 507
Michigan	53, 358	53, 349	420	31	53, 778	53, 380
Minnesota	97, 145	98, 716	7	4	97, 152	98, 720
Missouri	178, 880	187, 829	901	4	179, 781	187, 833
Nebraska	3, 165	3, 708	--------	--------	3, 165	3, 708
North Dakota	667	614	--------	--------	667	614
Ohio	107, 088	69, 328	276	1, 858	107, 364	71, 186
Oklahoma	4, 902	3, 986	--------	--------	4, 902	3, 986
South Dakota	901	887	--------	--------	901	887
Tennessee	28, 521	27, 699	502	1	29, 023	27, 700
Wisconsin	8, 113	8, 451	10	18	8, 123	8, 469
Total	1, 179, 600	1, 081, 091	2, 974	4, 180	1, 182, 574	1, 085, 271
District 3:						
Alabama	70, 833	84, 492	80	5	70, 913	84, 497
Arkansas	40, 727	42, 560	--------	--------	40, 727	42, 560
Louisiana	97, 845	177, 598	7	5	97, 852	177, 603
Mississippi	1, 688	3, 241	--------	--------	1, 688	3, 241
New Mexico	5, 911	2, 682	--------	--------	5, 911	2, 682
Texas	185, 154	224, 190	--------	19	185, 154	224, 209
Total	402, 158	534, 763	87	29	402, 245	534, 792
District 4:						
Colorado	23, 892	30, 810	--------	17	23, 892	30, 827
Idaho	812	802	1	--------	813	802
Montana	53	905	--------	--------	53	905
Utah	10, 710	4, 623	--------	--------	10, 710	4, 623
Wyoming	6, 974	2, 373	--------	--------	6, 974	2, 373
Total	42, 441	39, 513	1	17	42, 442	39, 530
District 5:						
Arizona	555	129	1	--------	556	129
California	610, 819	425, 968	366	90	611, 185	426, 058
Nevada	3, 628	371	--------	--------	3, 628	371
Oregon	110, 008	120, 880	5	10	110, 013	120, 890
Washington	36, 650	6, 955	47	35	36, 697	6, 990
Total	761, 660	554, 303	419	135	762, 079	554, 438
Total United States	3, 449, 153	3, 243, 807	10, 202	6, 325	3, 459, 355	3, 250, 132

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[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.

TABLE 5.—Sales of all other petroleum asphalt products in the United States, 1953–54, by districts and States

[Short tons]

District[1] and State	Asphalt cements and fluxes		Emulsified asphalt		Total	
	1953	1954	1953	1954	1953	1954
District 1:						
Connecticut	6,265	10,660	622	357	6,887	11,017
Delaware	[2] 718	1,034	4	19	722	1,053
Florida	21,887	19,421	4,246	1,852	26,133	21,273
Georgia	6,155	54,230	2,130	486	8,285	54,716
Maine	3,604	4,973	342	57	3,946	5,030
Maryland and D. C	22,293	29,125	1,144	1,290	23,437	30,415
Massachusetts	31,866	25,929	2,012	1,488	33,878	27,417
New Hampshire	485	473	61	32	546	505
New Jersey	111,942	140,016	4,323	2,581	116,265	142,597
New York	50,265	37,437	2,124	1,185	52,389	38,622
North Carolina	16,697	16,407	4,376	1,719	21,073	18,126
Pennsylvania	108,197	164,656	1,989	1,581	110,186	166,237
Rhode Island	87,559	21,518	221	229	87,780	21,747
South Carolina	1,427	713	--------	19	1,427	732
Vermont	151	2,722	24	9	175	2,731
Virginia	13,558	13,139	232	149	13,790	13,288
West Virginia	43,480	2,994	1,107	42	44,587	3,036
Total	[2] 526,549	545,447	24,957	13,095	551,506	558,542
District 2:						
Illinois	174,673	190,289	2,714	2,140	177,387	192,429
Indiana	32,737	107,773	638	270	33,375	108,043
Iowa	[2] 3,797	7,006	113	322	3,910	7,328
Kansas	[2] 13,982	17,733	39	--------	14,021	17,733
Kentucky	14,013	3,519	162	128	14,175	3,647
Michigan	50,018	35,114	1,940	15,867	51,958	50,981
Minnesota	37,835	52,147	1,511	1,253	39,346	53,400
Missouri	[2] 32,174	65,593	857	439	33,031	66,032
Nebraska	[2] 6,647	4,483	36	8	6,683	4,491
North Dakota	4,506	2,961	93	--------	4,599	2,961
Ohio	99,804	84,077	6,498	1,441	106,302	85,518
Oklahoma	[2] 29,233	7,079	369	--------	29,602	7,079
South Dakota	[2] 1,466	2,203	--------	--------	1,466	2,203
Tennessee	4,399	11,087	1,737	134	6,136	11,221
Wisconsin	[2] 62,322	59,539	2,006	1,409	64,328	60,948
Total	[2] 567,606	650,603	18,713	23,411	586,319	674,014
District 3:						
Alabama	3,143	6,238	97	206	3,240	6,444
Arkansas	16,679	14,670	5	--------	16,684	14,670
Louisiana	15,059	29,382	13,771	277	28,830	29,659
Mississippi	[2] 9,958	7,781	438	393	10,396	8,174
New Mexico	[2] 5,648	7,859	144	19	5,792	7,878
Texas	52,871	50,046	3,661	4,725	56,532	54,771
Total	[2] 103,358	115,976	18,116	5,620	121,474	121,596
District 4:						
Colorado	[2] 10,466	20,916	501	37	10,967	20,953
Idaho	1,094	1,815	--------	15	1,094	1,830
Montana	2,693	3,022	41	6	2,734	3,028
Utah	4,544	10,079	9	48	4,553	10,127
Wyoming	[2] 2,083	16,227	--------	--------	2,083	16,227
Total	[2] 20,880	52,059	551	106	21,431	52,165
District 5:						
Arizona	481	613	63	43	544	656
California	103,576	32,397	4,541	5,990	108,117	38,387
Nevada	492	1,020	55	10	547	1,030
Oregon	3,545	3,916	2,953	2,749	6,498	6,665
Washington	10,062	7,746	17,983	1,976	28,045	9,722
Total	118,156	45,692	25,595	10,768	143,751	56,460
Total United States	[2] 1,336,549	1,409,777	87,932	53,000	1,424,481	1,462,777

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[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[2] Revised.

TABLE 6.—Sales of petroleum asphalt and road oil in the United States, 1953–54, by districts and States

[Short tons]

District[1] and State	Asphalt cements and fluxes	Emulsified asphalts	Cutback asphalts	Total		Change, percent	Road oil		Change, percent
				1954	1953		1954	1953	
District 1:									
Connecticut	63,761	7,695	33,614	105,070	99,199	5.9	2	--------	--------
Delaware	32,374	35	9,357	41,766	[2] 30,167	38.4	--------	70	--------
Florida	325,195	15,893	148,149	489,237	330,425	48.1	2	611	−99.7
Georgia	233,148	34,000	65,635	332,783	283,929	17.2	1	325	−99.7
Maine	28,307	11,933	47,473	87,713	71,009	23.5	--------	116	--------
Maryland and D. C	234,589	22,693	88,999	346,281	340,013	1.8	92	850	−89.2
Massachusetts	285,519	3,490	72,398	361,407	354,940	1.8	21	945	−97.8
New Hampshire	8,873	109	31,226	40,208	33,159	21.3	12	26	−53.8
New Jersey	673,006	4,641	81,142	758,789	760,573	−.2	3,699	6,688	−44.7
New York	494,859	82,730	177,557	755,146	750,511	.6	6,628	427	1,452.2
North Carolina	215,989	39,177	107,801	362,967	224,145	61.9	1	239	−99.6
Pennsylvania	668,202	43,676	126,147	838,025	742,528	12.9	9,428	4,737	99.0
Rhode Island	137,666	3,352	34,851	175,869	174,614	.7	152	206	−26.2
South Carolina	72,239	39,520	53,974	165,733	155,873	6.3	--------	3,852	--------
Vermont	12,301	574	19,550	32,425	31,308	3.6	--------	2	--------
Virginia	99,595	5,917	107,514	213,026	190,004	12.1	--------	284	--------
West Virginia	46,627	19,925	29,938	96,490	136,028	−29.1	303	289	4.8
Total 1954	3,632,250	335,360	1,235,325	5,202,935	--------	10.5	20,341	--------	3.4
Total 1953	[2] 3,328,917	313,968	1,065,540	--------	[2] 4,708,425	--------	--------	19,667	--------
District 2:									
Illinois	878,814	8,392	84,995	972,201	1,074,245	−9.5	178,407	152,157	17.3
Indiana	259,117	74,848	100,472	434,437	396,016	9.7	26,569	20,213	31.4
Iowa	48,185	29,403	73,268	150,856	[2] 126,506	19.2	34,039	39,612	−14.1
Kansas	74,472	81	161,389	235,942	[2] 294,921	−20.0	1,763	4,206	−58.1
Kentucky	73,608	17,212	76,667	167,487	177,438	−5.6	11,391	2,986	281.5
Michigan	193,766	28,785	75,631	298,182	357,011	−16.5	32,091	34,332	−6.5
Minnesota	264,179	5,830	212,212	482,221	336,173	43.4	54,785	65,099	−15.8
Missouri	348,561	8,310	95,973	452,844	[2] 394,624	14.8	58,518	62,807	−6.8
Nebraska	65,187	63	63,957	129,207	[2] 79,234	63.1	6,079	6,379	−4.7
North Dakota	64,248	801	40,509	105,558	74,271	42.1	4,261	15,456	−72.4
Ohio	382,714	97,905	248,280	728,899	735,894	−1.0	31,651	21,239	49.0
Oklahoma	65,027	1,761	204,635	271,423	[2] 298,007	−8.9	6,336	7,275	−12.9
South Dakota	44,354	81	35,673	80,108	[2] 56,816	41.0	57,506	29,263	96.5
Tennessee	186,206	12,942	64,752	263,900	236,906	11.4	--------	5,629	--------
Wisconsin	167,363	7,612	61,633	236,608	[2] 240,218	−1.5	160,207	176,225	−9.1
Total 1954	3,115,801	294,026	1,600,046	5,009,873	--------	2.7	663,603	--------	3.2
Total 1953	[2] 3,107,774	255,837	1,514,669	--------	[2] 4,878,280	--------	--------	642,878	--------
District 3:									
Alabama	170,224	19,866	97,263	287,353	282,621	1.7	14,544	102	14,158.8
Arkansas	104,133	26,065	41,627	171,825	171,374	.3	6,618	2,696	145.5
Louisiana	328,103	10,466	25,251	363,820	240,851	51.1	--------	656	--------
Mississippi	34,765	13,268	7,301	55,334	[2] 80,926	−31.6	--------	495	--------
New Mexico	105,663	658	93,183	199,504	[2] 122,890	62.3	6,925	3,840	80.3
Texas	683,773	25,580	173,435	882,788	946,979	−6.8	28,652	7,109	303.0
Total 1954	1,426,661	95,903	438,060	1,960,624	--------	6.2	56,739	--------	280.8
Total 1953	[2] 1,181,258	89,916	574,467	--------	[2] 1,845,641	--------	--------	14,898	--------
District 4:									
Colorado	123,095	493	81,725	205,313	[2] 217,062	−5.4	17,451	18,566	−6.0
Idaho	31,777	1,501	49,252	82,530	45,353	82.0	31,924	17,203	85.6
Montana	22,213	3,793	63,792	89,798	54,762	64.0	11,964	8,078	48.1
Utah	62,382	48	40,260	102,690	114,179	−10.1	24,744	23,869	3.7
Wyoming	33,110	--------	39,330	72,440	[2] 64,009	13.2	25,224	15,939	58.3
Total 1954	272,577	5,835	274,359	552,771	--------	11.6	111,307	--------	33.1
Total 1953	[2] 216,877	6,761	271,727	--------	[2] 495,365	--------	--------	83,655	--------
District 5:									
Arizona	12,268	7,064	26,114	45,446	53,005	−14.3	8,938	21,659	−58.7
California	1,192,969	117,713	67,602	1,378,284	1,553,957	−11.3	457,051	481,976	−5.2
Nevada	22,115	1,265	6,703	30,083	35,978	−16.4	14,823	17,445	−15.0
Oregon	257,077	7,651	43,667	308,395	265,902	16.0	9,923	18,387	−46.0
Washington	96,462	3,231	92,878	192,571	205,095	−6.1	3,575	29,779	−88.0
Total 1954	1,580,891	136,924	236,964	1,954,779	--------	−7.5	494,310	--------	−13.2
Total 1953	1,696,068	155,948	261,921	--------	2,113,937	--------	--------	569,246	--------
Total United States 1954	10,028,180	868,048	3,784,754	14,680,982	--------	4.6	1,346,300	--------	1.2
Total United States 1953	[2] 9,530,894	822,430	3,688,324	--------	[2] 14,041,648	--------	--------	1,330,344	--------

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[1] States are grouped according to petroleum-marketing districts rather than to conventional geographic regions.

[2] Revised.

FOREIGN TRADE

IMPORTS[1]

Imports of asphalts, including solid and liquid petroleum asphalts and a minor quantity of natural asphalts, increased substantially in 1954 to 622,000 short tons valued at $6.6 million compared with 464,000 short tons (revised figures) in 1953 valued at $5.4 million. Most of the petroleum asphalts originated in the Netherlands Antilles and Venezuela, while virtually all the natural asphalts came from Trinidad and Tobago. These import figures represent quantities received in the continental United States and the noncontiguous territories; the monthly imports shown in table 1, taken from the Monthly Petroleum Statement of the Bureau of Mines, are for the continental United States only.

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[1] Figures on imports and exports compiled by Mae B. Price and Elsie D. Page, of the Bureau of Mines, from records of the U. S. Department of Commerce.

EXPORTS

TABLE 7.—Petroleum asphalt and products exported from the United States, 1953–54, by countries of destination

[U. S. Department of Commerce]

Country	1953		1954	
	Thousand short tons	Thousand dollars	Thousand short tons	Thousand dollars
North America:				
Canada	13	$789	35	$1,215
Canal Zone	3	65	2	45
Cuba	(1)	21	1	38
Mexico	20	577	15	281
Other North America	5	185	6	144
Total North America	41	1,637	59	1,723
South America:				
Brazil	17	954	20	836
Chile	5	[2] 181	8	279
Colombia	11	363	17	510
Ecuador	1	[2] 42	9	279
Other South America	1	81	2	146
Total South America	35	[2] 1,621	56	2,050
Europe:				
Turkey	2	52	3	101
Other Europe	2	176	2	116
Total Europe	4	228	5	217
Asia:				
Burma	7	282	8	211
Ceylon	3	83	(1)	(1)
India	12	362	18	516
Indochina	21	625	65	2,534
Indonesia	22	680	12	323
Iraq	4	160	-----	-----
Japan	3	109	1	48
Nansei and Nanpo Islands, n. e. c.			1	31
Korea, Republic of	7	304	-----	-----
Malaya	3	86	4	127
Pakistan	29	806	-----	-----
Philippines	26	1,074	26	1,000
Thailand	5	270	1	30
Other Asia	(1)	78	1	38
Total Asia	142	4,919	137	4,858
Africa:				
Belgian Congo	9	331	5	170
Federation of Rhodesia and Nyasaland	(1)	[3] 15	3	73
French Morocco	19	776	(1)	27
Union of South Africa	19	621	17	574
Other Africa	6	175	5	181
Total Africa	53	1,918	30	1,025
Oceania:				
New Zealand	2	55	4	128
Other Oceania	(1)	6	(1)	12
Total Oceania	2	61	4	140
Grand total	277	[2] 10,384	291	10,013

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[1] Less than 1,000.
[2] Revised figure.
[3] Southern Rhodesia.

TECHNOLOGY

A noteworthy advance in asphalt technology during 1954 has been the rapidly expanding use of asphalts in various types of hydraulic engineering structures. Several asphalt-lined water reservoirs of varying sizes were completed during the year, further entrenching this type of construction as a sound and economical means of providing water storage for various purposes. There has been further expansion of the construction of asphalt groins to prevent beach erosion and as a means of building up new areas of sand beaches. Properly designed, and constructed with enough asphalt cement, these asphaltic groins are proving to be a most economical solution to a long-standing engineering problem.

Another interesting development was brought to light in culmination of a 10-year study on asphalt treatment of railroad roadbeds, as reported in the February 1954 issue of the Bulletin of the American Railway Engineering Association. This report indicates that an asphalt penetration treatment and chip seal of the entire roadbed (including ties) results in substantial economies in maintenance-of-way costs. A study of equipment development suitable for rapid performance of this type of work has been initiated by The Asphalt Institute in collaboration with leading equipment manufacturers and with advice of personnel from the research staff of The Association of American Railroads.

In the highway field the use of emulsified asphalts, further diluted with water, is being rapidly adapted to a number of applications. These diluted emulsions are being used to set up bases strong enough for use by traffic during construction and for sealing open-textured asphaltic concrete pavements. Highly diluted emulsified asphalts are being used in conventional water sprinklers to treat unsurfaced streets in some cities. This treatment minimizes dust by gradually building up an asphalt-stabilized surface through several such applications.

The asphalt industry has recognized the importance of continued research and development on the use of asphaltic materials by establishing greatly expanded laboratory facilities in the new Asphalt Institute building on the campus of the University of Maryland. A modern, well-equipped laboratory occupies almost the entire first floor of this building. The board of directors of The Asphalt Institute has approved a broad program of research and development, including the following major items:

1. Asphalt mix design.
2. Stabilization of base materials with asphalt.
3. Flexible pavement-thickness design.
4. Surfaces of airfields resistant to heat and fuel spillage.
5. Asphalt in hydraulics.

C. Helium

Helium

By H. S. Kennedy and Henry P. Wheeler, Jr.

⁂

GENERAL SUMMARY

THE HELIUM ACT (50 Stat. 885; 50 U. S. C. 161, 163–166), as amended, places the responsibility for conserving, producing, and selling helium upon the Secretary of the Interior, acting through the Bureau of Mines—the only producer of helium in quantity in the world. It operates 4 plants—1 each at Amarillo and Exell, Tex.; Otis, Kans.; and Navajo (Shiprock), N. Mex.

The demand for helium has increased steadily since the decline immediately after World War II and is expected to exceed the capacity of the present plants in the near future. The Congress has appropriated $6,000,000 for constructing a new plant. In addition to providing additional capacity to meet increased demands for helium, the new plant will enable the Bureau of Mines to better conserve the helium in the Government-owned reserves at Amarillo and Navajo.

Technologic progress was made during the year in developing methods of improving the efficiency of production at the present plants and utilizing, for helium production, helium-bearing gases that also contain high percentages of nitrogen.

All statistical data presented herein originated in the Bureau of Mines.

PRODUCTION

The Bureau of Mines operated all 4 helium plants in 1954 to produce 190,741,361 cubic feet of helium—18 percent more than the previous record annual production, achieved in 1953. The conservation helium in the Cliffside field, which was produced and conserved by injection into the helium-bearing formation during periods when the production exceeded the demand, supplied helium during peak periods and was replenished when the demand was relatively low. During the year 784,000 cubic feet of helium was injected into the reserve and 470,000 cubic feet withdrawn, resulting in a net gain of 314,000 cubic feet of conservation helium. At the year's end 87,300,000 cubic feet of conservation helium remained in the Cliffside field.

In the 1955 Supplemental Appropriation Act the Congress provided $6,000,000 to the Bureau of Mines for constructing a new plant to meet increasing demands for helium. Its site had not been selected at the end of the year.

TABLE 1.—Helium production in the United States, 1921–54

Year	Active plants	Production (cubic feet)
1921–January 1929[1]	Fort Worth, Tex., plant	46,088,787
1929 (April)–1942	Amarillo, Tex., plant	164,867,140
1943	Amarillo and Exell, Tex., plants	116,307,432
1944	Amarillo and Exell, Tex., Otis and Cunningham, Kans., and Navajo (Shiprock), N. Mex., plants.	126,933,130
1945	Amarillo and Exell, Tex., and Otis and Cunningham, Kans., plants.	94,733,744
1946	do	58,236,385
1947	Amarillo and Exell, Tex., plants	70,297,700
1948	Exell, Tex., plant	63,143,513
1949	do	55,165,482
1950	do	81,394,416
1951	Amarillo and Exell, Tex., and Otis, Kans., plants	112,009,180
1952	do	144,556,141
1953	Amarillo and Exell, Tex., Otis, Kans., and Navajo, N. Mex., plants.	[2] 161,086,800
1954	do	190,741,361
Total		[3] 1,485,561,211

[1] No helium was produced at Government helium plants in February or March 1929. The Fort Worth plant was shut down January 10, 1929, and the Amarillo plant was not put into operation until April.

[2] Revised figure.

[3] Includes 87,294,419 cubic feet extracted at the Exell plant and injected into the Government-owned Cliffside gas field for conservation, in excess of that subsequently withdrawn.

SHIPMENTS

The 4 plants shipped 189,873,071 cubic feet of helium valued at over 3 million dollars in 1954—128,575,251 cubic feet to Federal agencies and 61,297,820 cubic feet to non-Federal customers. This comprised 756 tank-car shipments, 54 trailer shipments, and 154,492 cylinder shipments.

The utilization of helium shipping containers, particularly tank cars, continued to improve throughout the year, and no serious shortage of containers occurred, even though the quantity of helium shipped increased 20 percent over 1953.

The continuing increase in helium shipments indicated a need for additional shipping containers, and the Bureau of Mines, acting as agent for the Atomic Energy Commission, ordered 5 new helium tank cars and 5,000 standard-type cylinders. Bids for 7 additional cars for the Atomic Energy Commission and 10 cars for the Bureau of Mines were opened in December, and these cars were to be ordered early in 1955. When these cars are delivered, there will be 107 tank cars in the Government pool.

CONSUMPTION AND USES

About 67 percent of the helium shipped in 1954 went directly to Federal agencies compared with 63 percent in 1953. At least an additional 23 percent was used by private industry on Government contracts; thus, approximately 90 percent of the total consumption was for the benefit of the Government.

The Department of the Navy continued to be the largest Federal user of helium, followed by the Atomic Energy Commission, Department of the Air Force, Weather Bureau, and Department of the Army, in that order. Other Federal agencies that used moderate quantities of helium were the National Advisory Committee for Aeronautics, the Bureau of Mines, and the National Bureau of Standards.

Helium is used directly by the Government in airships, meteorological balloons, Atomic Energy Commission and guided-missile operations, shielded-arc welding, titanium production, and many different fields of research. The principal private uses are helium-shielded arc welding, leak detection, titanium production and fabrication, as a fill gas in electronic equipment, as an inert atmosphere in the growth of germanium and silicon crystals for transistors, as a diluent with oxygen to make breathing easier for persons suffering from asthma and other respiratory ailments, as a mixture with flammable anaesthetic gases to reduce explosive hazards, and in medical and industrial research. A relatively small quantity is used to inflate toy balloons and for advertising purposes.

Private industry uses helium in producing such diverse items as airplanes, jet engines, electronic devices, farm tractors, water heaters, refrigerators, and beer barrels.

PRICES

The Helium Act (50 Stat. 885; 50 U. S. C. 161, 163–166) provides that Federal agencies may requisition helium from the Bureau of Mines by paying proportionate shares of the expenses incident to the administration, operation, and maintenance of the Government's helium plants and properties. In the fiscal year ended June 30, 1954, the price for Federal agencies was $14.65 per thousand cubic feet. The price for Federal agencies in the fiscal year ended June 30, 1955, was $15.50 per thousand cubic feet.

The price to non-Federal purchasers under contracts approved before March 13, 1954, was $13.50 per thousand cubic feet. Effective March 13, 1954, the price was increased to $19.00 per thousand cubic feet pursuant to an amendment to the Regulations Governing the Production and Sale of Helium (30 C. F. R. 1). A charge of $2.00 per thousand cubic feet is applicable to both of the above non-Federal prices if the helium is compressed into standard-type cylinders.

RESERVES

Helium is a constituent of the atmosphere estimated at 1 part in 185,000 to 200,000 parts of air at the earth's surface. It also is found in small quantities in radioactive rocks and in gases from some mineral springs, volcanoes, and fumeroles; but the only known substance from which helium can be extracted economically in large quantities is helium-bearing natural gas. All natural gases do not contain significant amounts of helium; usually the gases of higher helium content are found in fields that overlie buried granite ridges, such as the buried Amarillo Mountains of the Texas Panhandle, and in fields closely associated with igneous intrusions, such as the Rattlesnake field, San Juan County, N. Mex.

Government Helium Reserves.—The Government owns or otherwise controls 4 helium-bearing natural-gas deposits that are estimated to contain about 3 billion cubic feet of recoverable helium. Two of these deposits—Helium Reserve No. 1, Woodside Structure, Utah, and

Helium Reserve No. 2, Harley Dome, Utah—are on lands of the public domain. These two reserves are relatively small and have not been used for the production of helium.

The other two Government reserves contain larger quantities of helium and are being utilized in producing helium to meet current demands. The Government-owned Cliffside gas field, which supplies helium-bearing gas to the Amarillo, Tex., helium plant, produced about 34 million cubic feet of helium in 1954 to meet current demands. The Government-leased Rattlesnake gas field, which supplies helium-bearing gas to the Navajo (Shiprock), N. Mex., helium plant, produced about 42 million cubic feet in 1954.

Other Sources of Helium-Bearing Natural Gas.—The Bureau of Mines is extracting helium in its Exell, Tex., and Otis, Kans., plants from natural gas produced by private companies primarily for commercial sale. As this natural gas is produced and consumed as fuel whether or not the helium is removed, extracting the helium is conservation in its truest sense.

The recoverable helium estimated to be available to the Exell and Otis plants in gas produced for fuel markets is about 7 billion cubic feet, mostly in the Channing area of the Texas Panhandle gas field, which serves the Exell plant. The helium-bearing gas available to the Otis plant has been depleted at a much faster rate but is still important because the plant facility for its recovery already exists.

In addition to the privately owned natural gas processed for helium at the Exell and Otis, Tex., plants, several other areas are known from which relatively high helium content gas is produced for fuel markets and could be made available for helium extraction. A notable example is the Keyes field of Cimarron County, Okla., a large deposit of natural gas containing about 2 percent helium by volume. The gas from this field contains a relatively high percentage of nitrogen, however, and consequently has a relatively low B. t. u. heating value. The Bureau of Mines now is engaged in a cooperative study with a private company, which controls a large part of the field, to investigate possible methods of extracting helium and improving the heating value in a joint operation (see Technology).

In general, the percentage of helium in gas from other prospective areas is less than that in gas processed by the present plants, but the additional cost incurred in processing the leaner gas could be offset to some extent by the economies inherent in larger scale operations. Unfortunately, from a conservation viewpoint these fuel gases are in production now, and much of the helium contained therein will be lost before the helium demand becomes great enough to justify its extraction. Thus, the only helium reserves that the Nation can depend upon for the future are those controlled by the Government.

CONSERVATION

Whenever possible, the Bureau prefers to produce helium from the helium-bearing gas available to the Exell and Otis plants rather than the reserves in the Cliffside and Rattlesnake fields serving the Amarillo and Navajo plants. Also, any production at Exell in excess of the current demand is conserved by injection into the nearby Cliffside field. Before 1953, 88,400,000 cubic feet of helium had been conserved in this manner.

To meet the present high demands for helium, however, the Bureau must operate all four of the plants, and the Government-owned reserves at Amarillo and Navajo are being reduced accordingly. Also, it has become necessary to use the helium conserved in the Cliffside field as an expedient in filling peak demands in excess of the combined output of the plants. Although a net gain of 314,000 cubic feet of conservation helium was achieved in 1954, it was not enough to offset the withdrawal of 1,427,981 cubic feet in 1953, and the amount of conservation helium in the Cliffside field has been reduced by more than 1 million cubic feet during the past 2 years.

Consequently, the Bureau of Mines is reducing rather than augmenting its reserves for the future. This undesirable condition will be corrected, at least temporarily, when the new plant, authorized recently by the Congress, is completed. This plant will recover additional helium from privately owned helium-bearing gas that is produced for fuel markets and will enable the Bureau of Mines to stop depleting the Government-owned reserves.

FOREIGN TRADE

Helium is not known to be produced in commercial quantities outside the United States. Relatively small quantities of helium are exported annually, but only upon application to the Secretary of State and upon issuance by him of a license authorizing such exportation.

TECHNOLOGY

In August 1954 the Bureau of Mines agreed to undertake, in cooperation with the Colorado Interstate Gas Co. of Colorado Springs, Colo., preliminary engineering studies to determine the feasibility of a joint operation in the Keyes field of Oklahoma to process gas from that field for the extraction of helium, with a coincident improvement in the heating value of the gas. The studies indicated that a plant to accomplish the desired results is technically feasible and that the economics of such a venture depends upon the distribution of plant and gas costs between the two objectives.

The technical problems involved in removing excess nitrogen from a gas to improve its heating value also are of interest to the Bureau of Mines in connection with operation of the Amarillo plant. The Government-owned residue gas from this plant has a heating value too low to permit the ready sale of the gas in commercial fuel markets, a factor that has limited production of helium at the plant. The knowledge obtained from the Keyes studies will help the Bureau improve this situation.

The Bureau continued its modest helium research program, aimed at providing fundamental information regarding helium and helium-bearing gas and improving the efficiency of helium production and conservation. The survey of newly discovered occurrences of natural gas to determine their helium content continued. A study of the phase relationships of natural gas from the Rattlesnake field of New Mexico was completed.

Outstanding progress was made in a detailed study of the helium-extraction cycle to determine the efficiency of heat-exchange equipment and the refrigeration cycle in general. This study has pointed out several areas where improvements in designs and techniques and increased use of instrumentation offer considerable prospect for increased output and reduced costs. These improvements will be incorporated into the design of the new plant, as well as the present plants, if subsequent investigations confirm their value and practicability.

On December 22, 1954, the Interstate Commerce Commission published a notice of intent to revise specification ICC–107A for helium tank cars by relaxing the factor of safety applicable to the steel cylinders mounted thereon. This revision, which has subsequently become effective, will permit the design and use of cars that are lighter in weight but still have greater helium capacity. The unit cost of transporting helium will thus be reduced, which will effect a considerable saving to helium users.

PART III. APPENDIX

Tables of Measurement

Volumetric measures

	U. S. gallons	Imperial gallons	Cubic feet	Barrels	Cubic centimeters	Liters	Cubic meters
1 U. S. gallon [1]	1	0.83268	0.13368	0.02381	3,785.4	3.7853	0.0037854
1 imperial gallon [2]	1.201	1	.16054	.028594	4,546.04	4.5460	.004546
1 cubic foot	7.4805	6.22888	1	.17811	28,317.01	28.316	.028317
1 barrel [3]	42	34.972	5.6146	1	158,987.55	158.98	.15899
1 cubic centimeter	.00026417	.00021996	.000035314	.0000062895	1	.00099997	.000001
1 liter	.26418	.219976	.035316	.0062899	1,000.027	1	.001000027
1 cubic meter	264.17	219.97	35.314	6.2898	1,000,000.	999.97	1

[1] U. S. gallon=the volume occupied by 231 cubic inches.

[2] 1 imperial gallon=the volume occupied by 10 pounds of water at 62° F. when weighed against brass in air at 30" barometric pressure.

[3] 1 barrel=42 U. S. gallons.

Weight measures

	Pounds	Kilograms	Short or net tons	Metric tons	Long tons
1 pound	1	0.45359	0.0005	0.00045359	0.00044643
1 short or net hundredweight	100.0	45.359	.05	.04536	.04464
1 gross or long hundredweight	112.0	50.802	.056	.05080	.05
1 kilogram	2.2046	1	.0011023	.001	.0009842
1 short or net ton	2,000	907.185	1	.90718	.89286
1 metric ton	2,204.6	1,000	1.1023	1	.98421
1 long ton	2,240	1,016.06	1.12	1.01606	1

NOTE.—1 English water ton=the volume occupied by 1 long ton of water at 60° F.

Index

By Mabel E. Winslow [1]

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Because nearly all commodity chapters in Minerals Yearbook, volume II, follow a rather generalized outline (General Summary, Production (in certain chapters including Mining Methods), Prices, Distribution, Consumption, Stocks, Technology, Foreign Trade, and World Production), references to such data have been omitted under the various commodity headings, although they were included in past Yearbook indexes. However, outstanding new developments under Technology have been indexed, as well as some information by States and countries. Work of Government agencies most intimately associated with the mineral industries, such as the Bureau of Mines and the Geological Survey, has also been indexed.

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